

I/O News

Translation from MBASIC to 32K SBASIC

Teach Yourself to Program in C

New Bulletin Board for Cromemco Users

THE OFFICIAL PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF CROMEMCO USERS

Volume Four, Number Four

Single Copy Price \$10.00

New High Resolution Computer Graphics For Video Applications

Cromemco announced a dramatic improvement in computer graphics capabilities with the new S-Series of graphics products for its 68000-based computers. These new products provide a broad range of features and benefits for configuring high capability graphics computer systems:

- Input and output video flexibility
- Image overlaying
- Full-color image digitization
- Hierarchical image planes
- 4-to-1 continuous zoom
- Pan and scroll
- Image wrap-around
- 256,000 Color Palette
- NTSC or PAL Standards
- Stenciling Option * 1024 x 1024 image size resolution

The new products provide a capability for Cromemco computers to generate images to the maximum resolution of television standards (either NTSC or PAL), to provide easy interface (input and output) to standard video equipment, and to preserve full computer program control for flexibility of application.

The new products include four new IEEE-696 standard boards which can be easily plugged into any of Cromemco's bus-structured microcomputer systems (considering, of course, the available bus slot space). The four new boards, plus Cromemco's SDD color digitizer board, form the company's S-Series of graphics interface

boards.

The new products include the following boards:

PART NO.

SVID — Color Video Generator Board (available for NTSC and PAL video standards)
SDMA — Video Memory Controller
256KTP — 256K bytes Two-port Memory
SDCM-NTSC — Color Modulator Board, RGB-to-Broadcast (available for NTSC or PAL video standards)

In addition, the SDD Color Digitizer Interface is now available in both the NTSC and the PAL video standards.

The comprehensive nature of this board set is illustrated in the system diagram shown in Figure 1.

The SVID and SDMA boards work together to form a two-board color graphics display generator that is the heart of a graphics system. This generator can display images with 756 x 484 pixel resolution out of a total image size of 1024 x 1024 pixels (NTSC version; resolution is 756 x 577 pixels in the PAL version). Up to three SDMA boards can be attached to a single SVID board; each SDMA allows independent zoom and pan of an image plane, giving total control of multiple image planes.

The 256KTP is a two-port memory developed exclusively for use with the S-Series of graphics boards. Access to the data in the display memory via a direct connector

Continued on page 12

FANCY FONT: A Program to Make Your EPSON Printer Output BEAUTIFUL

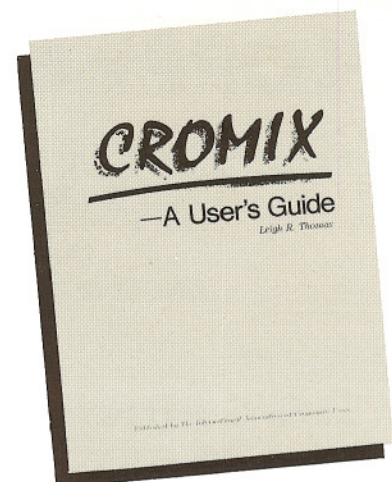
by Alan O'Neill

With the introduction of GRAFTRAX options for the EPSON printers, the popularity of the printer and their deserved reputation for dependability, someone was bound to take full advantage of the combination. That "someone" is a company called SoftCraft, located at 222 State Street, Madison, Wisconsin 53703. A toll free number is available for calls placed within the U.S.: 800-351-0500; callers outside the U.S. should call (608) 257-3300.

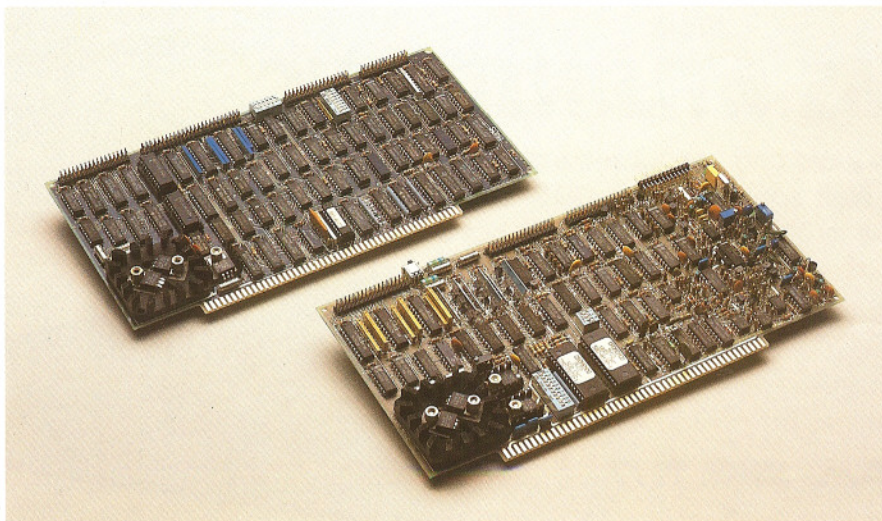
Their contribution to my delight in using my CROMEMCO / EPSON combination is a program called Fancy Font (Price = \$180). This program takes full advantage of the capabilities of the graphics options in the EPSON printer to produce nearly letter-quality printing. Added features in-

Continued on page 10

Now Available!!



See Ad On Page 14



6 To 1350 MEGABYTES

As low as \$50.00 per Megabyte



HIGH PERFORMANCE HIGH CAPACITY- FLOPPY & HARD DISK SUBSYSTEMS

From

SYSTEMS ATLANTA, INC.

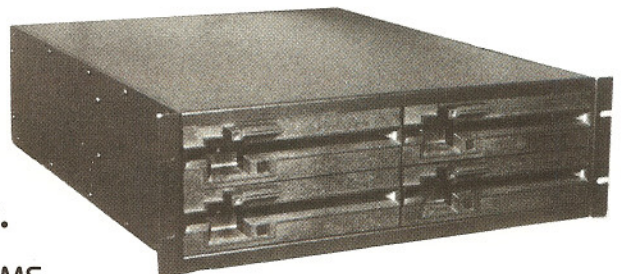
Over 400 models and configurations—custom cables
one year warranty, high speed backup utility supplied with each unit
Let us know your problems—We already have the solutions

SYSTEMS ATLANTA, INC.

Highway 5, P.O. Box 99
LEBANON, GEORGIA 30146
(404) 928-0240

EXPERTS IN CROMEMCO SYSTEMS SINCE 1977.

Discounts for authorized CROMEMCO dealers and OEMS.



Need Solutions to Your Hardware/Software Needs... CALL US!

We are a factory authorized Cromemco dealer, specializing in turn-key systems. In addition to the standard software available, we also offer these specially designed packages.

- Custom CDOS I/O Drivers
- Custom WordStar I/O for CDOS
- ASKARI for CDOS/Cromix

- Custom WordStar I/O for Cromix
- CDOS-CP/M Simulator for Cromix
- Modem Communications for Cromix
- Custom Cromix and Utilities

Offer varies in Houston Area
Available only from
Gunn Enterprises, Inc.



NO DEALER DISCOUNT

Gunn Enterprises, Inc.
5615 Richmond, Suite 150
Houston, TX 77057
713/781-6911



I/O News

The Official Publication of The International Association of Cromemco Users is available through membership in the association. Editorial and advertising policies are designed for the enlightenment of the members in regard to new uses for, and developments of, Cromemco products and other products compatible with Cromemco systems.

COVER FEATURES

- 7 Translation from MBASIC to 32K SBASIC
- 15 Teach Yourself to Program in C
- 28 New Bulletin Board for Cromemco Users

ARTICLES & FEATURES

- Cover S-Series Graphics Boards
- Cover Fancy Font

DEPARTMENTS

- 5 input...
- 6 output...
- 14 New Products
- 16 Current Versions of Cromemco Software
- 17 bits & bytes, nibbles & tweaks
- 18 Back Issues of I/O News
- 20 Tec Tips
- 22 Close Encounters of the C-10 Kind
- 24 Inside Cromix
- 26 32K Classroom
- 27 Soft Tips
- 30 Classified Ads & Advertiser Index
- 31 Local User Group Listing
- 32 Commercial User Group Listing

I/O News (ISSN 0274-9998) is published bi-monthly by The International Association of Cromemco Users (a California corporation), P.O. Box 17658, Irvine, CA 92713. General offices are at 4750 Von Karman Avenue, Suite 450, Newport Beach, CA 92660. Telephone: (714) 955-0432. Second-class Postage Paid at Santa Ana, CA. **POSTMASTER: Send address changes to I/O News, P.O. Box 17658, Irvine, CA 92713.**

Subscriptions to I/O News are entered with membership in The IACU. Yearly memberships may be purchased for \$42 (U.S. delivery address), \$49 (delivery address in Canada or Mexico), and \$60 (other international delivery address). Contact IACU for multi-year membership rates. Back issues of I/O News are available for \$10.00 per issue. Please note: all prices are in U.S. dollars.

Return postage must be included with all manuscripts and photos submitted if they are to be returned. The IACU and I/O News accept no responsibility for the return of unsolicited materials.

All rights in letters sent to IACU and I/O News will be treated as unconditionally assigned for publication and copyright to comment editorially and to edit.

Copyright © 1984 by The International Association of Cromemco Users. All rights reserved. Nothing may be reprinted in whole or in part without written permission of the publisher.

Richard Kaye Lynn L. Platzek
Editor and Publisher Advertising/Production Manager

William E. Jaenicke Art Direction
Technical Editor Howard Millman

Printing Typography
The Dot Generator Dynacomp

input...

Editor:

About six years ago John Nordine and I came across a number puzzle known as the Seven/Eleven (7/11) Store problem. The first programmer we gave it to said, "that's simple, I'll have the answer for you in 10 minutes using this computer." After one hour the program was interrupted and it was determined that it would possibly run another year before the solution was found. John Nordine then wrote a Cromemco 16K BASIC program on the problem again and wrote another solution in the 'C' language. We compiled and ran it on two computers—the Cromemco 68000 CROMIX and the AT&T 3B2. The results were very interesting. The Cromemco 68000 CROMIX gave an answer in 4 minutes and 10 seconds. The AT&T 3B2 gave the same answer, but took about 13 times longer—1 hour and 5 minutes.

This is the problem. A customer enters a 7/11 store and checks out 4 items. The clerk calculates the total cost, telling the customer it is \$7.11. The customer looks and tells the clerk he has made a mistake by multiplying the four numbers instead of adding them. The clerk corrects the procedure and adds the prices of the four items, but still arrives at the same total of \$7.11. What is the price of each item?

Should your readers try to solve this (there is a solution) they may send the solution to John Nordine at JEPSAN Group, Inc., John will publish his 'C' program and accompanying solution in the next I/O News. The program can be run by those of your readers whom are interested on various 'C' machines to see comparative performance readings.

Sincerely,

Phil Schneider President, JEPSAN Group
4778 Broadmoor, S.E. Grand Rapids,
Michigan 49508

Dear Mr. Schneider,

Thanks for the challenge! And for those of you who put this to the test, we would like to know the results. I wonder if the competition might be interested as well? Ed.

Editor:

I am facing the following problem when using the Disk Linker V.03.53 [sic]: In large FORTRAN IV programs with several COMMON BLOCKS when using (linking only) a BLOCK DATA subprogram module (a named one with a named COMMON) the parameters which are initialized are not correct-

ly passed to other modules using the same COMMON block. Is there any limitation to the Disk Linker concerning the size of COMMONs or does Disk Linker incorporate any bugs? What is the latest version of Disk Linker?

I am a I/O News subscriber as well as a FORTRAN IV programmer. But I must complain that you don't write enough about FORTRAN (always about BASIC!).

Sincerely yours, Dennis Photopoulos, Civil Engineer Athens, Greece

Dear Mr. Photopoulos:

This letter is in regard to your correspondence of January 2, 1985, in which you described a problem involving the linking of FORTRAN modules. First, in your letter you refer to the "disk linker V.03.53". I must assume you are referring to the CDOS program LINK.COM version 3.43 (there is no link program of version 3.53, the highest is 3.44). Secondly, I assume you are operating under the CDOS operating system.

I contacted Jerry Adams, the Technical Manager of the Cromemco Sales Support Office in Woburn, Massachusetts. He is the most knowledgeable person I know regarding FORTRAN on Cromemco systems. As I had hoped, he relayed a wealth of information in reference to LINK.COM, as well as the two other linkers available for Cromemco systems. As this pertains to other development software which utilize LINK.COM (e.g. the Macro Assembler and 'C' compiler), as well as FORTRAN IV, I will present Adams' discussion in its entirety.

To begin with, LINK.COM knows nothing about COMMON in FORTRAN. It simply sees modules as labels and addresses, which it adjusts relative to other modules in a program and arrives at the fixed memory addresses that are used when the program is loaded and executed. It is not a "disk linker" per se, since it does its work in memory, and then writes the result to disk. It uses memory to store a table of entry points to various modules.

At this point, Adams gave a short explanation of the functioning of the three Cromemco linkers:

LINK.COM — reads a module into memory, and makes changes to the addresses. It then writes this back to the disk.

BLINK.BIN — performs the same function as LINK.COM, but does so disk-to-disk. It is more sophisticated and can handle many more pointers. This link program is available under the CROMIX operating system.

OVERLAY LINKER — consists of an overlay handler, which is incorporated in the user programs. This handler routine searches memory for a specified module. If it is not currently located in memory it will search the disk, and load it from there.

Back to LINK.COM. As you proposed, there is an apparently undocumented bug in the link program. To understand it, it is necessary to explore the manner in which memory is used by CDOS and LINK.

A FORTRAN program (or any other .COM program) is loaded for execution at 100H in memory (low memory). CDOS resides at high memory. Beneath CDOS resides the LINK.COM program, and beneath this its table of entry points. Beneath this are the various modules of the program and final-

ly the program itself. Therefore, the memory available for storing the table of module entry points is limited. Thus, the number of modules is, in fact, limited. The bug is that LINK.COM doesn't generate an error when the table limit is exceeded. Information regarding the modules that do not fit in the table is simply lost.

There is another aspect to this table of entry points: it is dynamic, and allows for unresolved entry points. This means that if reference is made to a module that has not yet been linked, the entry point for that module is unresolved, and must be filled in later. To accomplish this the system utilizes a stack to store unresolved labels. Naturally, this requires additional memory. Because of these dynamics, the order in which the modules are linked becomes important. If they are ordered such that a module does not make reference to an as yet unlinked module, then there will not be unresolved labels, and consequently no need for the stack. On the other hand, if there are a number of modules which reference a module at the end of the linking order, the stack itself may be quickly exhausted. Adams postulated that the top of the stack might be colliding with the bottom of the entry-point table. In short, the order in which modules are linked can become critical if there are numerous (15 — 20) modules involved.

He also pointed out that the CROMIX link program, BLINK.BIN, does not suffer from these restrictions. With BLINK, it is possible to generate .COM programs up to 64K minus the size of CDOS. Thus, applications can be developed under CROMIX to execute under CDOS, and these applications can have considerably more memory available for the program. So you might consider using CROMIX to expand your capabilities in development of FORTRAN applications for CDOS.

Finally, I would like to comment on your complaint that I/O News does not provide enough material related to FORTRAN. You are correct in your assessment. However, we are entirely dependent on our members for providing the editorial materials which we publish. If there is no input, there can be no output. Perhaps you might be interested in starting the ball rolling by submitting a FORTRAN related article. Often, this is sufficient to stimulate interest among other users, and generate additional materials.

As an aside, I mentioned the lack of editorial materials related to FORTRAN to Adams, and he replied that this may be due to the fact that 99% of development work done using FORTRAN is for proprietary software, and consequently very "hush-hush."

I hope that this information will be of some assistance. We would be grateful if you could let us know whether or not these ideas helped solve your problem. Good luck.

Bill Jaenicke
Technical Editor



output...



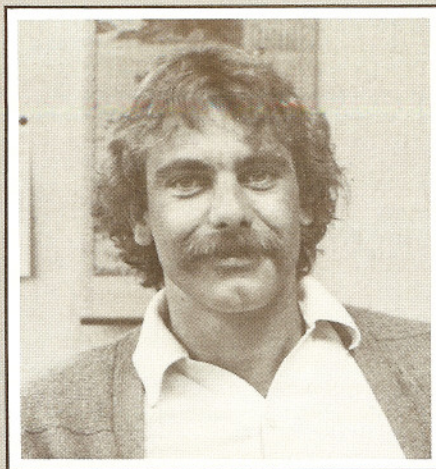
Lynn Platzek

In case you haven't noticed ...

No, your eyes aren't playing tricks with you. The size of the type in this issue is smaller. Like everyone else, we are feeling the pinch of production and mailing costs. So to cut our own costs, without reducing the amount of information presented, we have elected to go to a smaller type size. This helps in two ways: we can get more of what you like on a page, and at the same time reduce the number of pages without reducing the amount of content.

You may also have noticed that the paper stock is of a lighter weight. Again, a measure taken to help reduce production and mailing costs. The reduced cost and weight of the stock should make it easier for us, without affecting the quality you have grown to expect. The cover stock will remain heavy, so your copies of I/O News will last and last.

These changes are experimental, and we are depending on you, our readers, to let



Bill Jaenicke

us know if you find the changes acceptable. A phone call or a short note will do. We'll tabulate your responses as either "like" or "don't like." Based on the results, we will either continue with the new format, or revert back to the larger type size.

Suggestion Box:

Those of us here at I/O News are concerned about how you feel about the contents of the magazine. Do you find the information useful?, or are we missing the boat. Are there topics that you would like to see covered in greater detail? Have we missed anything? We would very much like to hear from you in this regard. You can send your suggestions to us at I/O News, in care of the Suggestion Box. Your input would be greatly appreciated.

Public Domain Program Disk:

Over the years we have published a number of interesting and useful programs and utilities. The source code for these have been presented in a variety of languages. Unfortunately, not everyone has access to the necessary compiler (FORTRAN, 'C', etc.), and are thereby deprived of the use of the programs.

A solution to the above problem is to send copies of the "runnable" programs to those who desire them. We envision the following: you send us a disk and we will load the programs onto it and send it back to you.

At this point, we don't have a whole heck of a lot to offer. But you can change that. When you send in a disk, include on it a program or utility that you find useful. In this way the software storehouse will grow.

That all seems simple enough, but there are some additional considerations. For example, what operating system will the software run under (CDOS, Z-80 CROMIX, 68000 CROMIX, or UNIX)? Is the program targeted for a specific machine, such as the C-10? What programs are available? What about documentation?

In answer to the above mentioned points, we intend to publish a list, each issue, of what we have available. The list will contain the program name, its source language, the operating system(s) under which it will run, a description of what it does, and whether or not there is accompanying documentation.

The need for some convention is apparent. We propose the following: When you

contribute a program, include a text file (created with SCREEN) with the name <PROgram_name.doc>. This text file should contain the pertinent information noted above, i.e., what operating system is it for, any necessary documentation, etc. Also, be sure to include your return address (legibly).

As to disk formats, at this time we are capable of using only 5 1/4 inch disks under CDOS or CROMIX. So please specify the format of the disk when you send it.

As mentioned, our present storehouse is very meager. But it is a beginning. Here's what we can offer at this point:

Z-80 CROMIX UTILITIES:

1. MOUNTA.BIN and UNMOUNTA.BIN: Two utilities which allow non-privileged users to mount and unmount disks under Z-80 CROMIX. No documentation— they work just like their original CROMIX counterparts MOUNT and UNMOUNT.


2. DELAY.BIN: A utility to delay execution of a command file until a specified time. Written in 'C' and compiled for use under Z-80 CROMIX. A description of this program appears in this issue's Inside CROMIX column. Documentation provided (DELAY.DOC).

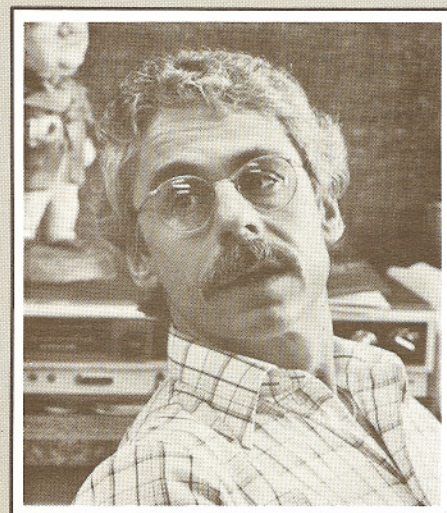
C-10 PROGRAMS:

1. GLIZARD.SAV: Space Glizards, a 32K SBASIC game utilizing the graphics character set of the C-10. No documentation. Supplied as a "saved" program. Source code was published in I/O News Vol. 4, No. 2.

CDOS/CROMIX PROGRAMS:

TWRITER.COM: A program to make your terminal a typewriter. Source is FORTRAN (TWRITER.FOR). Documentation available (TWRITER.DOC).

If the list grows large enough, we will publish a check list on which you can indicate the programs you want. We are looking forward to hearing from you. 



Richard Kaye
Editor

Translations From Microsoft BASIC Into Cromemco 32K STRUCTURED BASIC

by M.J. Willner

Occasionally a BASIC program is offered by the author or found listed in a popular computer magazine, a book of other source document which looks sufficiently interesting that one would like to key it into his Cromemco system. After all, the program is free except for the price of the diskette and the time it will take to perform the translation. It may represent an important addition to ones library. Ostensibly all one should have to do is to enter 32K STRUCTURED BASIC and write the program into RAM, SAVE it in binary form and then RUN. With 32K STRUCTURED BASIC the variable names can also be extended for clarity. However, experience shows that we are not quite home free yet.

Many available BASIC programs were written for a specific personal or business computer, often in one of the versions by Microsoft. A program written in Microsoft BASIC for one computer will not necessarily run on another brand, even when there is a common source. Most of the system may resemble the original version from Dartmouth College, but differences are likely to be encountered, especially with respect to I/O statements, CRT Terminal functions, disk memory access calls and arithmetic expressions. A short article, such as this one, cannot hope to cover all of these nuances in the language. Also, we will ignore one-for-one adjustments wherein the Cromemco 32K STRUCTURED BASIC program either uses a different expression or a default to perform the same function. What will be addressed are those changes requiring more thought and effort.

Before proceeding one might consider the alternative of buying the particular version of Microsoft BASIC the program was written in, especially if the number of lines of code to be converted is large. That option will doubtless eliminate a number of the problem areas, although it could create some new ones. Microsoft BASIC will typically run under CDOS. However, there is no assurance that the MBASIC program under consideration will run unchanged. For example, screen functions will probably still have to be altered. Other anomalies described below may also be encountered. Philosophically, knowing the differences between BASIC's is not necessarily a bad idea. Therefore, we'll think inexpensive and continue with preparations for keying.

Cromemco's STRUCTURED BASIC is a very powerful language. It incorporates an unmatched hierarchical structure which makes it especially useful for business applications, including the Keyed Sequential File Management (KSAM), Print Using commands, block oriented control commands, dynamic array dimensioning, binary coded decimal (BCD) data handling capabilities, etc. It is a semi-compiled version of BASIC

that tends to run faster than interpreted versions. Files can be stored and retrieved either in ASCII or binary form. The arithmetic accuracy is fourteen places, which is greater than for the Microsoft BASIC found on most personal computers. With all of these added features it handles both scientific programs and business programs with equal aplomb. However, that is not the question. Our quest is to translate from a version of Microsoft BASIC to 32K STRUCTURED BASIC that runs on our Cromemco computer.

Let's look at a typical program to be translated and the possible modifications that will have to be made. FINPKGS is a small program written by Leonard Prince of the North Orange County Computer Club for his own use in evaluating second trust deeds in California or mortgages in Eastern states as potential investments. These instruments are typically discounted to increase the effective yields in line with recent high interest rates. The program helps in the evaluation by supplying accurate answers to questions that arise when information furnished by the offeror is not complete. The program is written in a version of Microsoft BASIC that runs on his home brew computer with a CP/M operating system. While it does not cover all of the major discrepancies that have been encountered to date between Microsoft BASIC and Cromemco's 32K STRUCTURED BASIC, it is nevertheless an appropriate example to illustrate an article such as this one. The original program is shown in Listing A and the translated version in Listing B. References will be made to the changes as appropriate in the discussion that follows.

In looking at the original of FINPKGS as well as other Microsoft BASIC programs, one perceives that each programmer has his/her own style. Some write more compact code than others, or they utilize subroutines and other functions in a different way. The possibilities for creating unique programs that will run on one system and not another appear to be as varied as human nature. On the other hand, every HOL is finite in its dimensions and there are only so many possibilities for non-compatibility. The problem is to ascertain the differences. We conclude that the list of "major" anomalies in this article may not be complete on the simple basis that all of them may not have been encountered yet in the several programs that have been translated. However, the items identified below were observed partly on the example program and partly on other more lengthy ones. They should therefore be labeled as highly probable:

1. Program exceeds size of user area in RAM.
2. Different PRINT format.
3. Source program contains svar matrices.
4. Improper nesting of GOSUB routines.
5. Data not read by READ command.

6. Screen functions handled differently.

Program Size—The desire to key in a program may be unrelated to the number of lines of code. Some are quite lengthy, running to several pages of printed text, or 1000 lines. If one has the perseverance that should not be a deterrent. Under such circumstances a likely error message is "102 Out of Memory." The usual first reaction is to strip all of the REM statements (we can keep the original document in which the program was printed). However, that step usually won't be sufficient. 32K is required for STRUCTURED BASIC and about 14K for CDOS. Those with CDOS operating systems will discover that leaves only about 18K for the program. CROMIX users will have a larger user area in memory available, but that does not preclude the occurrence of such an error message. Fortunately, 32K STRUCTURED BASIC incorporates chaining with COMMON. One has only to SAVE the portion already keyed in after backtracking to an appropriate break point. Then, one can continue under a separate program name or procedure. That choice may be influenced by the quantity and type of variables to be made common or global, also by the functions performed in the remainder of the overall program. Note that there are two types of COMMON statements, one for each method. The first type places the expression COMMON after the group of variable names which are to be conveyed to a program that is to be LOADED and RUN. The BEGINCOMMON/ENDCOMMON statement for procedures, however, accommodates only string variables and matrices. Arithmetic variables must be defined in the calling statements for passing to the procedure and returning from it.

When procedures are used, which provide a powerful hierarchy for program organization, the LIBBUILD program needs to be run after the procedures have been coded. As received on a Cromemco diskette the LIBBUILD program is in ASCII format, and it is also slightly too large to fit into the user area for those running CDOS. Therefore, it will be necessary to build slightly smaller version of CDOS using CDOSGEN, ENTER LIBBUILD and then SAVE it before running. LIBBUILD prompts the user, and it should be relatively easy to incorporate the procedure names following these steps.

The example program, FINPKGS, is too short to require this step. However, had an "Out of Memory" Error Message been received we would simply have broken the program into parts, placing the final group of subroutines into a Procedure labeled, say, a line of code might be inserted as follows:

1 Library "LIB"

in which the procedures are stored. Instead of simply calling a sub routine as before, we would replace it with:

XXX CALL Procedure.presentvalue

No passed variables need be enclosed in parentheses following this procedure, because it is complete within itself. Had the need arisen we would have included such variables, with those passed to the procedure separated from those passed back by a semicolon. At the end of the procedure, the return statement would have indicated only the variables whose values are to be passed back to the main program. FINPKGS is a comparatively simple example. Programs containing string variables in common can become much more complicated. In any case, the chained set of programs and procedure will be LOADED into RAM automatically as required at RUN time after changes have been made.

DIFFERENT PRINT FORMAT—No changes are likely to be required for printing arithmetic variables. But string variables are a different matter. Microsoft BASIC uses LEFT\$, MID\$, and RIGHT\$ calls, e.g.

```
130 PRINT LEFT$(A$,8);PRINT RIGHT$(A$,11)
```

These three keywords are also used in non-printing expressions, e.g.

```
1100 D=VAL (MID$(A$,4,2))
```

One has only to recognize that this system captures portions of strings as indicated by the meanings of the keywords, that the numbers within the parentheses are 1-based, rather than 0-based as for CROMEMCO 32K STRUCTURED BASIC software, and that the second number in the MID\$ statement is indicative of the length of string segment beginning at character 4. In 32K STRUCTURED BASIC it is usually simpler to utilize a new string variable for each portion of the data string. For example:

```
125 B$=A$(0,7) :C$=A$(10,X)
130 PRINT B$;C$
```

```
or 1100 Z$=A$(3,4) :D=VAL(Z$)
```

In FINPKGS note revised statements 90 through 120 and several of the PRINT statements.

SVAR MATRICES—String variable matrices are not allowed in STRUCTURED BASIC because of the method of partitioning string variables described above. For example, if M\$(3) is seen in a line of code which is not a DIMENSION statement it must be recognized as a matrix with three different values. In 32K STRUCTURED BASIC it represents a string that starts with the fourth character. The fix is either to increase the length of the single string variable (which is permissible in STRUCTURED BASIC) or to increase the number of string variable names and to overcome any execution problems by adding explicit statements as required. The amount of storage is approximately the same as for Microsoft BASIC; only the technique is changed—see "Using String Variables in BASIC", I/O News Vol. One, Number Three, January/February 1981 for further details. The example program FINPKGS does not contain a string variable matrix.

NESTING OF GOSUB ROUTINES—Some BASIC programs permit random distribution of GOSUB routines without regard to location in the program. For example:

```
3545 GOSUB 1010: E=FNR(MA):RETURN
4170 GOSUB 3545: R1=Z
```

32K STRUCTURED BASIC is structured in

form, and the code above represents improper nesting. An error message would result if an attempt was made to blindly key it in. SAVE and RUN. One solution is to renumber the GOSUB routines, placing them at the beginning or ending of the main program body (however, see Summary). In addition, a GOSUB XXXX within another GOSUB routine must be listed in the correct sequence. A better order that will not generate an error message would be:

```
3545 GOSUB 3550: E=FNR(MA):RETURN
4170 GOSUB 3545: R1=Z
```

A fairly easy practice is to add a digit in front of the statements that need to be moved down for proper nesting. See, for example line 520 in the original FINPKGS program. The backwards GOSUB statement was carried forward by a 1 in front of most of the original 400 series statements.

DATA NOT READ—In a similar vein, if a READ statement is placed within a FOR-NEXT loop and DATA precedes that loop it will not be read. Typically, Microsoft BASIC allows the DATA to be placed at the beginning of the program. Any READ statement which follows, whether in a FOR-NEXT loop or not, will proceed to read the DATA in sequence. An example is:

```
10 DATA JAN,FEB,MAR,APR,MAY,JUN,JUL,AUG,SEP,NOV,DEC
20 FOR I = 1 TO 12: READ M$(I): NEXT I
```

This example contains two problems. First, the DATA is outside and precedes the FOR-NEXT loop. Second, it is using a string variable matrix. The programmer intended to pre-fill the matrix with the abbreviations for all of the months. A dynamic solution may be better for STRUCTURED BASIC wherein M\$ yields the month DATA as it is needed:

```
10 DIM M$(35)
20 M$="JANFEBMARAPRMAJUNJULAUSEPNOVDEC"
30 FOR I = 1 TO 12: M$(I-1)="3-3,1"-1)
```

```
XX NEXT I
```

Leonard Prince's FINPKGS program did not contain DATA statements, and all of the INPUT variables followed the INPUT statement. Therefore, this type of fix was not necessary.

DISSIMILAR SCREEN FUNCTIONS—Most computer systems handle their screen functions differently, depending mainly upon the CRT Terminal used. Microsoft BASIC will differ from one version to the next in this regard, because of the unique requirements imposed by the computer manufacturer. For example, the Microsoft BASIC screen functions for Pet computers use enclosed numbers, e.g.

```
720 QW$="([19],[17],[17])"
```

Microsoft BASIC for the screen functions of another computer make will be different. For the Cromemco computers and 32K STRUCTURED BASIC one should refer to the ASCII Character table in the program Manual and to the Function Codes table in the 3102 Video Terminal User's Manual. The solution for the above example would be

```
715 DIM ESC$(0),HOMES$(1),CURDWN$(1)
720 ESC$=CHR$(27):HOMES$=ESC$+"H":CURDWN$=ESC$+"B"
```

From this point one can proceed in accordance with the dictates of the program and how QW\$ might be used else-

where. In FINPKGS the screen was cleared in line 35. The revised program accomplished the same function in line 20, but in a manner compatible with the Cromemco program.

SUMMARY—Six categories of discrepancies between Microsoft BASIC and 32K STRUCTURED BASIC have been identified that will require corrections if they are to be RUN on a Cromemco computer. Omitted from this discussion have been specialized calls to Input/Output devices, memory sectors or other functions that are not as likely to be found in a printed program for general consumption. Usually, one or more other items will require revision. Line 207 in the original of FINPKGS is an example. This statement permits continuation upon hitting the space bar. It was replaced with a pseudo null-string call, line 140 in the revised code, which responds to hitting the RETURN key instead. The revision is a slightly preferable equivalent, because RETURN is used generally for execution purposes.

As a final suggestion, it is recommended that the ordering of elements within a 32K STRUCTURED BASIC program should be as shown below to the extent that they are used. By reordering a Microsoft BASIC program accordingly during a translation good structuring will be promoted and assignment conflicts between global and local variables will be avoided:

DECLARE IN ORDER

1. COMMON variables
2. Global variables for PROCEDURES and FUNCTIONS
3. PROCEDURES with local variables
4. FUNCTIONS with local variables
5. Local variables within main program [main program]
6. DATA

Now that you are armed with these alerts, good keying.

About the Author

M.J. (John) Willner is Program Manager, Advanced Developments, in the Data Processing Products Division, Ground Systems Group, of Hughes Aircraft Company, Fullerton, California. He received a Bachelor of Electrical Engineering degree from Georgia Tech in 1950 and an MSEE from the University of Southern California in 1964. Most of his engineering career has been devoted to managing new technology developments in the areas of large scale integration (LSI), computer-aided design, sensors, signal processing, displays and electronic systems. For example, his organization developed two microprocessors that were used in defense systems as early as 1974. He has been involved with many applications and designs making use of the computer, including computer developments themselves. For his own personal computer he obtained a Z2D, which he is using initially for word processing and to run HOL programs that he wrote originally on IBM 370 and Amdahl mainframes. While translating some unique versions of BASIC to run on his system, he encountered the problems identified in this article and felt their solutions were worth passing on to others. The approach was more challenging, more instructive and more fun than buying the other BASIC programs...and some of the translation problems would still have remained to be solved (those related to the screen).


```

10 REM ***** FINPKGS *****
15 REM MISCELLANEOUS FINANCIAL FORMULAS
20 REM LEONARD PRINCE 1/4/80 (714)526-7881
25 REM REV 10/23/80 TO CONSIDER NOTES WITH SIMPLE INTEREST WITH PMT(I*P
27 REM rev 10/24 to pretty the display and always use simple interest for
28 REM less than interest payments per present practice. Effective interest
29 REM is compounded monthly.
30 REM Revised 11/1 to change print using for the compiler's use.
31 REM also to reduce error in cost formula evaluation
32 REM also to correct error in case of R I*P for C&E (needed ELSE)
33 REM revised 7/30/81 to add "effective interest given rate plus balance."
35 PRINT CHR$(11);
40 PRINT "*****"
50 PRINT "FINANCIAL PACKAGE -----"
53 PRINT "Lump remaining after N payments at I XpA."
55 PRINT "P)Principal given rate, interest, # months."
60 PRINT "R)Rate to pay off Principal N Months at Interest I XpA."
80 PRINT "I)Interest of monthly compounded future Sum with Present value."
100 PRINT "N)Number months to amortize at Principal & I XpA."
105 PRINT "C)ost to realize effective yield."
110 PRINT "E)ffective interest of loan not fully amortized."
115 PRINT "P)resent value of series of payments and final balloon with last
    payment."
117 PRINT "e)ffective interest of loan returning payments plus balance."
121 PRINT
130 INPUT "          your choice "; A$
135 IF LEFT$(A$,1) = "P" THEN GOSUB 980
137 IF LEFT$(A$,1) = "E" THEN GOSUB 1100
140 IF LEFT$(A$,1) = "R" THEN GOSUB 220
150 IF LEFT$(A$,1) = "P" THEN GOSUB 270
160 IF LEFT$(A$,1) = "I" THEN GOSUB 330
170 IF LEFT$(A$,1) = "L" THEN GOSUB 400
180 IF LEFT$(A$,1) = "N" THEN GOSUB 450
190 IF LEFT$(A$,1) = "E" THEN GOSUB 500
200 IF LEFT$(A$,1) = "C" THEN GOSUB 630
205 PRINT " Hit the space bar for another case. "
207 WAIT 0,1
210 GOTO 35
220 INPUT "Principal, Number months, Interest";P,N,I
230 I=I/1200 : F=(1+I)^(-N) : R=I/(1-F)*P
240 R = INT(100*R+.5)/100
250 PRINT "Rate to amortize = ";R
260 RETURN
270 INPUT "RATE $/mo , Int XpA, Number months";R,I,N
280 I = I/1200
290 P=R*(1-(1+I)^(-N))/I
300 Z$="###.###"
310 PRINT USING Z$;P
320 RETURN
330 INPUT " Present value, Future sum, Number months";P,S,N
340 I = -(1-EXP(LOG(S/P)/N))*1200
350 X$="###.##"
360 PRINT "INTEREST = ";
370 PRINT USING X$;I;
380 PRINT " XpA."
390 RETURN
400 INPUT "Rate, Principal,# months, Interest XpA.";R,P,N,I
410 I=I/1200
414 B$ = "Simple-interest": REM if real estate notes start using compound -
    change
415 IF R < P*I THEN PRINT " Simple interest assumed to determine the balance."
    ELSE B$ = "C"
416 IF LEFT$(B$,1) = "S" THEN B = (1+I*N)*P-R*N
    ELSE B = (R-I*((1+I)^N)*(R-I*P))/I
430 PRINT "Balance in "; N ; " months = ";
435 PRINT USING "###.###" ; B
440 RETURN
450 INPUT "Rate, Principal, Interest XpA.";R,P,I
460 I=I/1200
470 N=LOG(R/(R-I*P))/LOG(1+I)
480 PRINT "Number of months to amortize = ";N;"."
490 RETURN
500 PRINT "Principal, Cost,#months,Rate $/mo, Interest"
510 INPUT P,C,N,R,I
520 GOSUB 410
530 FOR K=1 TO 100
540 T=(B-R/I)*((1+I)^(-N))+R/I
550 E1 = (T-C)/C : IF ABS(E1) < .00001 THEN 600
560 I = I*(1+.2 *E1)
570 NEXT K
580 PRINT "Effective yield not determined to within "
590 PRINT "100 trys ---- Examine inputs!"
600 PRINT "Effective Yield = ";
605 PRINT USING "###.##" ; I * 1200 ;
610 PRINT " XpA."
620 RETURN
630 PRINT "Principal, Interest XpA, # mo., Rate $/mo., Desired yield."
640 INPUT P,I,N,R,E
650 GOSUB 410
660 E=E/1200
665 X = (1+E)^(-N) : T = B*X +R/E*(1-X)
680 PRINT " Price to pay for effective yield of ";
685 PRINT USING "###.##" ; E * 1200 ;
690 PRINT " XpA is:"
700 PRINT "          ";
705 PRINT USING "###.###.##" ; T
710 RETURN
980 REM a future sum which is the balance due after N payments.
990 INPUT "RATE, DESIRED INTEREST per A, NUMBER MONTHS, BALLOON."; R,I,N,S
995 I = I/1200
1000 PV1 = R*((1-(1+I)^(-1*N)))/I
1005 PRINT "Present value due to rate per month only = ";PV1
1010 PV2 = S*(1+I)^(-N)
1015 PRINT "Present value due to future balloon payment = ";PV2
1020 PV = PV1 + PV2
1025 PRINT "Present value due to monthly rate and balloon = ";
1030 PRINT USING "###.###.##" ; PV
1040 RETURN
1100 PRINT "Cost, #months, Rate $/mo, Balance"
1110 INPUT C,N,R,B
1115 I = .01
1120 GOTO 530

```

LISTING A

```

5 REM*****FINPKGS*****
10 REM LEONARD PRINCE 1/4/80 (714) 526-7881. REV D 7/30/81
15 Dim Esc$(0),Clear$(1)
20 Esc$=Chr$(27) : Clear$=Esc$+"E" : Print Clear$
25 Print"*****"
30 Print"FINANCIAL PACKAGE-----"
35 Print"L)ump remaining after N payments at I X per annum."
40 Print"P)Principal given rate, interest and # of months."
45 Print"R)ate to pay off principal N months at I X per annum."
50 Print"I)nterest of monthly compounded future sum with present value."
55 Print"N)umber of months to amortize at principal and I X per annum."
60 Print"C)ost to realize effective yield."
65 Print"E)ffective interest of loan not fully amortized"
70 Print"P)resent value of series of payments and final balloon with last
    payment"
75 Print"e)ffective interest of loan returning payments plus balance."
80 Print
85 Input"          YOUR CHOICE ",A$
90 If A$(0,0)="P" Then Gosub 980
95 If A$(0,0)="E" Then Gosub 1100
100 If A$(0,0)="R" Then Gosub 220
105 If A$(0,0)="P" Then Gosub 270
110 If A$(0,0)="I" Then Gosub 330
115 If A$(0,0)="L" Then Gosub 400
120 If A$(0,0)="N" Then Gosub 500
125 If A$(0,0)="E" Then Gosub 1250
130 If A$(0,0)="C" Then Gosub 650
135 Print"Hit RETURN for another case."
140 Input W$ : Goto 20
220 Input"Principal, Number of Months, Interest: ",P,N,I
225 I=I/1200 : F=(1+I)^(-N) : R=I/(1-F)*P
230 R=INT(100*R+.5)/100
235 Print"Rate to amortize =";R
240 Return
270 Input"RATE in $/month, Interest-X per annum, Number of months: ",R,I,N
275 I=I/1200
280 P=R*(1-(1+I)^(-N))/I
285 Print Using"###.###",P
290 Return
330 Input"Present value, Future sum, Number of Months: ",P,S,N
335 I=-(1-Exp(Log(S/P)/N))*1200
340 Print"INTEREST = ";
345 Print Using"###.##",I;
350 Print"% per annum."
355 Return
500 Input"Rate, Principal, Interest-X per annum: ",R,P,I
505 I=I/1200
510 N=Log(R/(R-I*P))/Log(1+I)
515 Print"Number of months to amortize = ",N,"."
520 Return
650 Print"Principal, Interest-X per annum, # of months, Rate in $/month,
    Desired yield: "
655 Input P,I,N,R,E
660 Gosub 1405
665 E=E/1200
670 X=(1+E)^(-N) : T=B*X+R/E*(1-X)
675 Print"Price to pay for effective yield of ";
680 Print Using"###.##",E*1200;
685 Print"% per annum is: ";
690 Print"          ";
695 Print Using"###.###.##",T
700 Return
980 Rem This routine finds the present value of a series of payments plus a
985 Rem future sum which is the balance due after N payments.
990 Input"Rate, Desired Interest per annum, # of months, Balloon: ",R,I,N,S
995 I=I/1200
1000 Pv1=R*((1-(1+I)^(-1*N)))/I
1005 Print"Present value due to rate per month only = ",Pv1
1010 Pv2=S*(1+I)^(-N)
1015 Print"Present value due to future balloon payment = ",Pv2
1025 Print"Present value due to monthly rate and balloon = ";
1029 Pv=Pv1+Pv2
1030 Print Using"###.###.##",Pv
1035 Return
1100 Print"Cost, # of months, Rate in $/month, Balance: "
1105 Input C,N,R,B
1110 I=.01
1115 Goto 1265
1250 Print"Principal, Cost, # of months, Rate in $/month, Interest:"
1255 Input P,C,N,R,I
1260 Gosub 1405
1265 For K=1 To 100
1270 T=(B-R/I)*((1+I)^(-N))+R/I
1275 E1=(T-C)/C : If Abs(E1) < 1E-05 Then Goto 1300
1280 I=I*(1+.2 *E1)
1285 Next K
1290 Print"Effective yield not determined within 100 trys ----"
1295 Print"Examine inputs!"
1300 Print"Effective yield = ";
1305 Print Using"###.##",I*1200
1310 Print"% per annum."
1315 Return
1400 Input"Rate, Principal, # of months, Interest-X per annum: ",R,P,N,I
1405 I=I/1200
1410 B$="Simple Interest." : Rem If real estate notes start using compound
1411 Rem interest - change.
1415 If R<P*I Then Do
1420 Print"Simple interest assumed to determine the balance."
1425 Else
1430 B$="C"
1435 Enddo
1440 If B$(0,0)="S" Then Do
1445 B=(1+I*N)*P-R*N
1450 Else
1455 B=(R-I*((1+I)^N)*(R-I*P))/I
1460 Enddo
1465 Print"Balance in ";N;" months = ";
1470 Print Using"###.###.##",B
1475 Return

```

Listing B

Fancy Font

Continued from front cover

clude true proportional spacing, a wide choice of type faces and sizes, and the capability of modifying the included type faces, or creating your own. The program includes type styles in Roman, SansSerif, Old English, and Script. There are also special character sets for Copyright and Trade Mark, all in an assortment of sizes from 8-point to 40-point. Mixing up to 10 type-faces/sizes in one document is allowed. Batch operations are easily set up and operated, so that a common set of type styles can be used with minimum use of your keyboard.

Before I go any further, let me state that I purchased this program, and SoftCraft has not solicited my comments. The published requirements for operation of the program is a "CP/M System with minimum 48K bytes memory (including CP/M) ..." and an EPSON MX (FX, RX)-80 (F/T) or IBM printer with GRAFTRAX-80 or GRAFTRAX-PLUS. It will also work with an MX-100 with graphics options installed. The interface requirements are full 8 bit parallel data transmission, or serial transmission (again with all 8 bits) at 2400 baud or more, no parity. Their very informative documentation notes that some of the earlier serial interface cards from EPSON were not capable of graphics transmission, e.g., EPSON 8141.

In my use of the program so far, I have discovered that it works well with both Cromemco's SCREEN and a word processor from SELECT INFORMATION SYSTEMS called SELECT, both operating with CDOS. I am still using Version 2.36, for the reason that it does everything I need, and I see no cause to fool with a good thing. Their documentation says that Fancy Font works with many common word processors, and I have no cause to doubt it.

The text file and command line options and controls are easy to use, and the variety of fonts makes any document much more readable. All line width, print position and spacing is under user control. In fact there are times when I wished the program was a little more "automatic." Each line must be studied and the line character count modified to produce a well shaped document. I have included samples of "before" and "after" text, taken from the first few lines of this article. The justification is accomplished by the addition of 1/120th inch spaces between each of the words in a line. Within a word, there are differences in the space occupied for letters such as "i" and "m", for example. "Normal" EPSON printing causes every character to occupy an equal amount of space, causing an "i" to appear to be much further from its neighbors than an "m."

Characters and words may be positioned on a line using an "absolute" internal command mode, allowing position control within 1/120th of an inch. The Fancy Font program makes me feel very much "in control" of what appears on the page, and where.

To make this program operate with our favorite system, there are a couple of little items that need attention. I am using

the PRI for driving my printer, and therefore direct this note to those in similar circumstances. Those using a TU-ART will find all of these changes should work for them, also. First of all, in the Drivers area of CDOS, the eight bits of the data byte are manipulated to cause bit seven (msb) to change states twice to appear as a "strobe" to the printer. Essentially, we transmit the character to be printed three times. Once with the "strobe" bit high, again with it low, and again with it high. Second, the cable from the 25 pin connector to the 36 pin connection of the printer is wired to operate this way. It connects bit seven to the strobe input on the EPSON.

As "normally" configured, there is no way for the eighth data bit (bit seven) to reach the printer uncontaminated by this bit switching. Also, the critical bit is wired to the strobe input on the EPSON.

To cause the printer to do all we desire, and to function as the Fancy Font program intends, it is necessary to find just one more bit to play with. The simple solution is to pick up the bit seven data at another port. An easy way is to add a wire to the cable from the computer to the EPSON from bit seven on another (unused) parallel port. I had a "spare" in my cable, and brought it outside the shell of the connector, terminated it with a pin, and plugged it into an adjacent connector (pin 22—bit seven out) plugged into one of the parallel ports of a TU-ART. The other end was connected msb (pin 9) in the 36 pin connector for the printer.

The Drivers now must be modified to first direct the full eight data bits to this "control" port before bit seven is reset for the beginning strobe sequence. To do this, I used SCREEN to add a line in the driver "Equates" like this:

ZAP EQU 24H ; Port to drive 8th Data bit

Then I moved to the list output drivers, and added:

OUT ZAP,A ; Set up the control bit

just after the printer is checked for BUSY, and before the parity (bit 7) stripping operation.

After that, I assembled the new drivers, and built a modified CDOS. Now the printer gets the bit 7 data some time before the rest of the character. The 5501 in the TU-ART latches the bit in place until the rest of the data, now including the "strobe" effect, is presented. Only then does the printer act on the data, (including bit 7) and print the character. With all eight data bits getting to the printer, it is possible to do any of the graphics the EPSON manual describes, and this makes possible the proper operation of the Fancy Font printing program. The changes do not affect the printer drivers when operating my EPSON in the usual way.

I am sure there are more elegant ways to create the effect of an eight bit data driver for the EPSON. In time, I will explore some of them. The methods outlined do not require any more than minimal changes to either the hardware or software, and incorporate common elements in many Cromemco systems.

There are a few things that you should know if you are thinking of using Fancy Font. It is S-L-O-W. The print-head makes multiple, one-direction passes across the paper to print each line. Another drawback is that under CDOS, Control-C, which their documentation says will abort printing, does not. (I would expect it to work fine under CP/M.) If you wish to abort printing, you have the choices of causing a disk read fault (by removing the disk), or pressing RESET. Further experimentation may reveal better ways, but that comes later. In the meantime, this program is producing higher quality print than I ever expected to see from an EPSON printer. I like it.

About the Author:

Alan O'Neill is a Micro-Computer Consultant specializing in Service and Training. His firm is T&E Engineering, 524 Thompson Ave, Mountain View, CA 94043, Telephone (415) 969-3854.

Entering the electronics industry nearly twenty-five years ago, Mr. O'Neill worked with the computers then in existence made by UNIVAC, Control Data, Systems Engi-

Example of input text for Fancy Font

```
\c\f6FANCY FONT:\f0
A Program to Make Your EPSON Printer Output
\c\f1BEAUTIFUL\f0
```

```
\j
With the introduction of GRAFTRAX options for the EPSON printers, the popularity of the printer and their deserved reputation for dependability, someone was bound to take full advantage of the combination. That "someone" is a company called SoftCraft, located in Los Angeles at 8726 So. Sepulveda Blvd. Their phone number is (213) 821-8476. \b
```

Their contribution to my delight in using my CROMEMCO / EPSON combination is a program called \f2Fancy Font\f0. This program takes full advantage of the capabilities of the graphics options in the EPSON printer to produce nearly letter-quality printing. Added features include true proportional spacing, a wide choice of type faces and sizes, and the capability of modifying the included type faces, or creating your own. The program includes type styles in Roman, \f4SansSerif\f0, \f3Old English\f0, and \f5Script\f0. There are also special character sets for copyright\f2C\f0 and Trade Mark\f2TM\f0, all in an assortment of sizes from 8-point to 40-point. Mixing up to 10 type-faces/sizes in one document is allowed. Batch operations are easily set up and operated, so that a common set of type styles can be used with minimum use of your keyboard.\b

NOW AVAILABLE!!

Powerful New Software Packages Including

RealWorld FOR 68000 & Z80 CROMIX

RealWorld™

RealWorld accounting packages offer advanced mini-computer design in their fully integrated systems. These packages have the professional features you need, such as full password protection, an extensive data integrity check system, and backup/restore facilities for all critical files. Packages include:

- General Ledger
- Payroll
- Accounts Receivable
- Accounts Payable
- Inventory Control
- Order Entry/Billing
- Sales Analysis

Software Standards supports the RealWorld packages in multi-user under 68000 CROMIX as well as in single-user under Z80 CROMIX. Coming soon to UNIX System V.

dBCOMPILER

dBcompiler from WordTech Systems is a powerful dBase II compiler. Compiled dBase II application programs operate without the presence of dBase II. The compiler gives the programmer the ability to generate machine-efficient, stand alone, effectively 'encrypted' programs. Generally, applications will execute faster when compiled, and require less space. In addition, dBcompiler offers an amazing speed increase in both sort and indexing operations.

VT100 & VT52 emulators

Software Standards VT100 and VT52 terminal emulators give your Cromemco systems the power to communicate with large DEC minicomputers. Available for 68000 & Z80 CROMIX as well as the C-10.



Software
Standards, Inc.

6191 Choctaw • Baton Rouge, La. 70805 • 504/355-8024

DISTRIBUTING TO
CROMEMCO DEALERS

RealWorld™ is a trademark of Realworld Corporation

dBCOMPILER is a trademark of WordTech Systems, Inc.

neering Labs and others.

For the past several years he has been involved in the Micro-Computer industry. He has worked with TeleVideo Systems, Inc. as Product Marketing Manager during the introduction of their new Computer Systems Division. Prior to that, he worked with Cromemco, Inc. both as Manager of the Customer Support Department, and as Special Projects Manager. While at Cromemco, he developed and implemented the Sales and Technical training programs. Earlier, he held the position of Technical Support Manager at Zilog, Inc. His experience includes involvement with many applications of micro-computers including remote-order-entry/warehouse-inventory systems, process control, business and word processing computers.

Tec-Ed Note: The address and phone number of SoftCraft given in the following examples is no longer correct. The correct address and phone numbers are given at the beginning of this article.

FANCY FONT.

A Program to Make Your EPSON Printer Output
BEAUTIFUL

With the introduction of GRAFTRAX options for the EPSON printers, the popularity of the printer and their deserved reputation for dependability, someone was bound to take full advantage of the combination. That "someone" is a company called SoftCraft, located in Los Angeles at 8726 So. Sepulveda Blvd. Their phone number is (213) 821-8476.

Their contribution to my delight in using my CROMEMCO / EPSON combination is a program called *Fancy Font*. This program takes full advantage of the capabilities of the graphics options in the EPSON printer to produce nearly letter-quality printing. Added features include true proportional spacing, a wide choice of type faces and sizes, and the capability of modifying the included type faces, or creating your own. The program includes type styles in Roman, SansSerif, *Old English*, and *Script*. There are also special character sets for copyright and Trade Mark™, all in an assortment of sizes from 8-point to 40-point. Mixing up to 10 type-faces/sizes in one document is allowed. Batch operations are easily set up and operated, so that a common set of type styles can be used with minimum use of your keyboard.



For Sale:

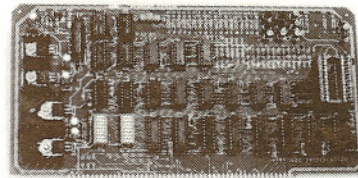
Cromemco System Z-2H

containing: ZPU, 16FDC with 3.08 ROM, 128K, PRI, IMI 7710; 11MB hard disk and WDI, 2 - 5 1/4"; Cromemco hardware and Op. Sys. manuals; CDOS 2.58, CROMIX 11.27, and CP/M 2.2 operating systems; 32K Structured basic, Cbasic, Mbasic, wordprocessing, and spreadsheet program, macro assembler — IMI 7710 hard disk replaced with a new unit 2/84 — motherboard and 7710 hard disk power connections reworked as per article in I/O NEWS — all items maintained and working — extra cooling fans installed.

asking \$3500

Call Larry at (817) 261-7199 after 7:00 CST or weekends
Also available: 1 more 64K board, TUART I/O board.

PROM PROGRAMMER



PROMBLASTER II

Programs: 1K x 8 to 32K x 8 EPROMS

2508, 2716, 2732, 2732A, 2763, 2764,

2764A, 27128, 27256,

48016, 68764 & MORE!

- On board LIF socket.
- Functions as an I/O device.
- Device address switch selectable.

Software: Written in C,
Uses fast programming algorithm on
2764's and up.



Ackerman Digital Systems, Inc.
DEPT. OF-1
216 W. Stone Court, Villa Park, IL 60181
Telephone (312) 530-8992

High Resolution Computer Graphics

Continued from front cover

or from the main bus allows rapid update of the image by the CPU or a DMA device. Up to six 256KTP boards can be attached to a single SDMA board, subject to board space limitations.

The SDCM Color Modulator Board provides professional quality color encoding for the RGB output signals from the SVID board. The output of the SDCM is a composite color signal that is encoded according to NTSC or PAL standards (different board versions are available for each standard; the version must be specified when ordering these boards).

The SDD is Cromemco's standard color digitizer board, which is now available in either the NTSC or the PAL video standard versions.

Outstanding Capabilities Zoom and Pan

ZOOM and PAN capabilities are built into the circuitry of the S-Series rather than being required in the software programs. The ZOOM feature allows the user to make the graphics appear larger or smaller on the screen, while the PAN capability can rapidly move the displayed screen around a large image that is stored in the computer.

The S-Series can provide an image field as large as 1024 dots, both horizontally and vertically. Therefore, the PAN feature permits the user to view any 756 pixel by 484 pixel contiguous portion of that larger image (756 x 577 in the PAL format). The panning command is processed in microseconds, so the movement appears to be instantaneous and continuous.

Similarly, the ZOOM feature allows the user to enlarge the pixels on the screen up to four times. Therefore, a smaller area of the stored image can be magnified. And, in fact, these changes can be made in very small increments, creating the impression of smooth transitions.

In addition, the ZOOM and PAN features can be performed concurrently to simulate objects moving toward or away from the viewer.

Image wrap-around

The S-Series offers a choice of ways to view all of a larger image. The PAN feature, of course, allows the user to move around the larger image. When the "edge" of that image is reached, the user can select one of two ways for the computer to treat the edge: either, have the image go black outside of the image area, or, bring in the other side of the image, just as if it were on a cylinder that was rotating. This second option is called wrap-around.

The S-Series can wrap the image around in a horizontal direction, in a vertical direction, or in a combination of horizontal and vertical directions.

256-color selection out of 256,000-color palette

For many applications, the outstanding color control offered in the S-Series graphics, along with the ability to change the image color even after it is created, provides degrees of artistic freedom not previously

available.

The S-Series can produce 256,000 combinations of the primary colors (red, green, and blue). Of this palette of 256,000 colors, any 256 can be displayed simultaneously. The combinations are made up of 64 different intensity levels of each of these primary colors. Therefore, the graphics can create any color that can be created on a video display.

1024 x 1024 Stored Image

Each 256KTP in a system holds a picture which is made up of 512 x 1024 4-bit nybbles. Two 256KTP boards gives an image which is 1024 x 1024 x 4 bits (i.e. 16 colors). Alternatively (under software control) two 256KTP boards can produce an image which is 512 x 1024 x 8 bits (i.e. 256 colors). A full 1024 x 1024 x 8 bit picture, therefore, can be stored with four 256KTP memory boards.

Graphic overlays

Using the S-Series graphics, you can overlay one graphic image on another or, overlay an image on a real-time video image. By handling the images in this way, each of the images can be controlled separately. As a very simple example, one image could be of a car, and another image could be scenery. When the scenery image was panned and wrapped around while the car image was stationary, the car would appear to be moving. Simple animation.

Digitizer

The digitizing circuitry in the SDD board accepts composite color video signal inputs from any standard video source (camera; VCR; disk) and converts the signal to RGB output or digital output that can be stored in computer memory.

Applications

The design of the S-Series graphics is especially well suited to the demands and standards of the fast-growing video equipment and video applications markets. The products are designed to receive input from or deliver output to all of the wide variety of video equipment available:

INPUTS	OUTPUTS
—Color Cameras	—RGB displays
—Black/White cameras	—RGB film camera
—Laser disks	—VCR
—Video cassette recorders & players	—Standard video monitor
—Special instruments: e.g. weather radar e.g. ultrasonic medical instruments	—CCTV network
	—Color printers
	—Color plotters

The S-Series provides the capability to create, manipulate, interconnect, store, and display a wide variety of high resolution images.

These graphics boards apply the power of the computer and the versatility and efficiency of computer-generated graphics to a variety of applications in the video area:

- Artwork generation
- Generating training tapes
- Closed circuit television networks
- Public information terminals
- Expert systems
- Interactive graphics
- Image data collection and analysis
- Picture data bases
- Animation

- Pattern recognition
- Simulation
- Television broadcast
- Solids modeling

Software

Cromemco is also introducing a new graphics applications software library, called BASELINE. This library of graphics drivers provides a large collection of parametric commands for the development of graphics programs.

The Baseline Graphics Software can be ordered for immediate delivery using Part Number BASLIN-D. It is available on small or large diskettes at a U.S. suggested list price of \$595.

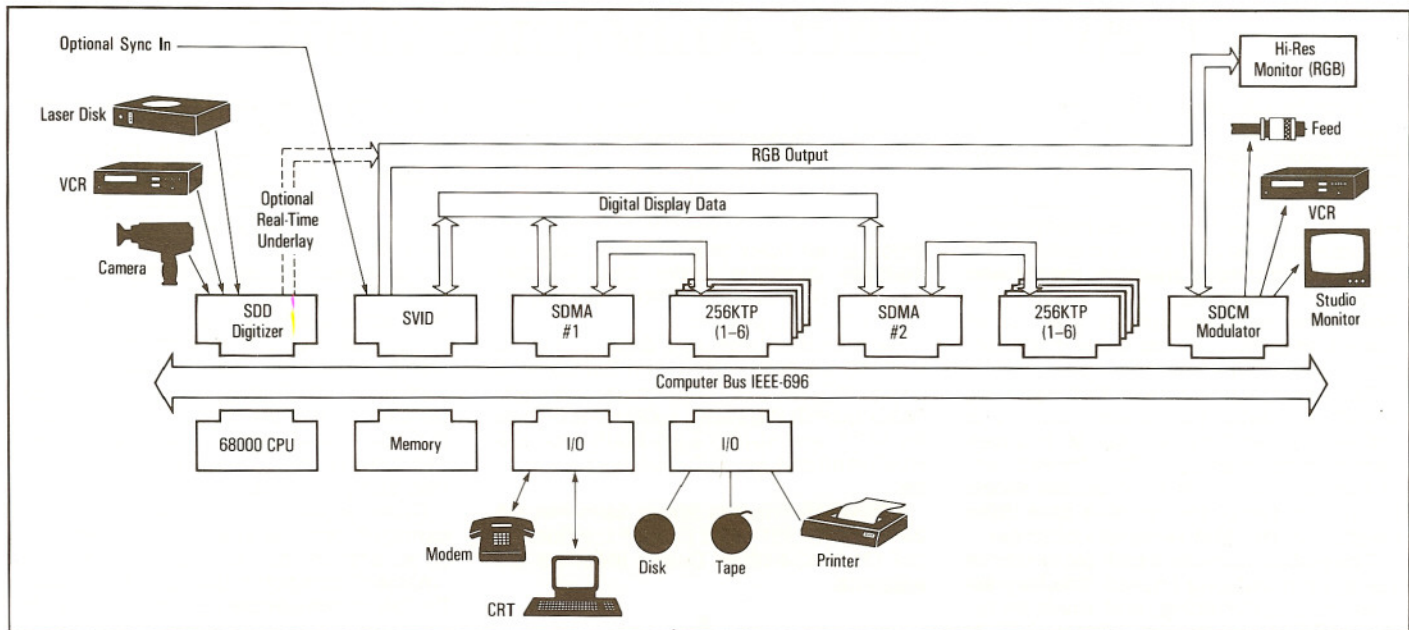
The new S-Series of graphics boards is available for immediate delivery. The following table shows the Part Numbers and U.S. Suggested List Prices of all of the products in this series.

S-SERIES GRAPHICS BOARDS	PART NO.	DESCRIPTION	LIST PRICE
SVID-NTSC—Color Video Generator Board for NTSC standards			\$795
SVID-PAL—Color Video Generator for PAL standards (require at least 1 SDMA and 1 256KTP)			\$795
SDMA—Video Memory Controller			\$795
256KTP—256K bytes Two-port Memory (for use with SDMA only)			\$1995
SDD-NTSC—Color Digitizer Interface (NTSC)			\$995
SDD-PAL—Color Digitizer Interface (PAL)			\$995
SDCM-NTSC—Color Modulator Board (NTSC) (RGB-to-Broadcast Std.)			\$995
SDCM-PAL—Color Modulator Board (PAL)			\$995

We're Interested!

We're Really Interested...in what you have to say. Especially about how you use your system...the problems encountered and the solutions effected...unusual uses or environments...and any practical applications you would be willing to share with fellow members. These can be short notes for departments like 'bits & bytes...' and 'Tec Tips,' or full feature articles.

Contact Richard Kaye or Lynn Platzek at I/O News for editorial guidelines or assistance. We're interested in unleashing your literary talents.



FEATURES

- TV broadcast quality computer graphics system
- Instant pan and zoom
- 1024 x 1024-point "canvas" with 756 x 484 display window for NTSC; 756 x 577 display window for PAL
- Two-port display memory works with fast 68000 processor
- Up to 16 million colors available for natural color rendition
- SDCM encodes output for use with VCR or studio feed
- SDD captures pictures from camera or tape input.

THE S-SERIES VIDEO SYSTEM

The components in the S-Series video system are building blocks which form an extremely high performance, easy-to-customize color display system. This system creates sharp images in lifelike color, using more than 1,000,000 picture elements (pixels) and up to 16,000,000 colors per image plane. Since these pictures are stored digitally they may be regenerated, edited, enhanced, or duplicated under control of one of Cromemco's high-speed supermicrocomputers. The S-Series video cards plug right into the computer bus, making it easy to add options such as a digitizer or more image planes. The combination of video quality and computer power is unmatched in the industry and finds applications ranging from digital paint systems in an art studio to solid modeling systems in an engineering lab.

SYSTEM ARCHITECTURE

There are five main boards in the S-Series video system. The first three form the display generator board set, comprising image memory (256KTP), video memory controller (SDMA), and color video interface (SVID). These boards provide a basic display capability when plugged into a 68000-based Cromemco computer. An input interface, the SDD, allows signals from a camera or video tape recorder to be digitized and stored for processing or display. An output interface, the SDCM, converts the video output from RGB + Sync into an NTSC composite signal which may then be fed to a video recorder, monitor, or studio feed. Activities of all these boards are coordinated and controlled by the host computer.

SYSTEMS RESOLUTION (Spatial)

The S-Series video system is based

around a 1024 x 1024 pixel workspace with a moveable 756 x 484 pixel viewing area (756 x 577 in PAL model). The viewing area corresponds exactly to the format used in broadcast television (with additional resolution as required for Nyquist-rate sampling). The quality of the S-Series video images matches the finest broadcast standards.

resolution. This number represents the number of different colors which may be present in a given image. The S-Series video

COLOR RESOLUTION

An often-overlooked but crucial factor which determines image quality is the color system allows this factor to be varied from 16 levels to 16,777,216 levels. High color resolution is used for lifelike renditions of objects, while lower resolutions suffice for stylized schematic representations of images. Images of 16 or 256 color levels use selected hues from a palette of 262,144 standard tones maintained in a color map; high resolution of color does not require use of the map.

1/0

\$\$\$ \$\$\$\$ For Sale \$\$\$\$ \$\$\$\$

BIG Z-2D SYSTEM

3102 'Smart' Terminal
 Built-in Pair 5" Disk Drives
 Persci 277 Dual 8" Disk Drive
 Morrow M-26 26-Meg Hard Disk
 Four 16KZ RAM, 8K Bytesaver PROM
 16 FDC, TU-ART, 8PI/O, D+7AI/O
 TV Dazzler, Two JS-1 Joysticks
 Measurement Systems 64K RAM
 D.C. Hayes Micromodem 100
 Multi-User BASIC, 32K S-BASIC, 16K BASIC
 Z-80 Assembler, COBOL, Dazzler Games
 MICAH Hard Disk CP/M 2.2 with CDOS EMULATOR
 Original Cost Over \$21,000
BEST OFFER TAKES IT ALL
 (Hardly used—it's a clean machine)
The Television Company
 1555 Rising Glen Road
 L.A., Calif. 90069
 (213) 657-2631

New Product Announcements

Sausalito, CA, January 8, 1985. Dr. Jerome Freedman announced today that MICRo Applications and Hardware (MICAHA) has just released a revised version of CP/M Plus for Cromemco computers called SUPER BIOS PLUS. The revision incorporates a unique method of memory management involving interbank memory moves and banking of disk drivers (documented in I/O News, Volume 4 Number 2). The use of these two techniques has made it possible to provide a 60K program area.

The new release incorporates EXPAND, a CDOS emulator for running Cromemco software under CP/M and MP/M, as a resident system extension (RSX). An additional component of the new release allows Cromemco computers to read data disks created on the IBM Personal Computer.

The system features a high performance file system utilizing hashed directory access, record buffering, and multi-sector disk I/O. Upward compatibility with CP/M 2.2 is assured for application programs. Hard disk support for 1 to 16 drives of up to 512 megabytes each is available. Console I/O redirection utilities are available for application program transparency. Enhanced and extended system utilities include programs to list file directories and transfer files. The enhanced BATCH facility allows for operation of many programs without re-keying command sequences. A user-friendly Help Facility displays the operation of the system commands and available options.

The MICAHA implementation features an industry standard version of CP/M Plus with Cromemco compatibility available

through disk formats for single and double sided diskettes using single and double density on both 5 1/4" and 8" media and CDOS program compatibility with EXPAND. Source code is provided for all modules which the user may want to modify. In addition, a fast COPY program and a disk formatting program make this a most powerful single-user operating system for Cromemco computers.

For a limited time only, discounts of up to \$250 are being offered on SUPER BIOS and SUPER BIOS PLUS combined with EXPAND. SUPER BIOS with EXPAND is on sale for \$175, and SUPER BIOS PLUS with EXPAND is on sale for \$375. Address inquiries to:

MICAHA 15 Princess Street Sausalito, CA 94965 (415) 331-6422 East of the Rockies call (314) 434-1896. Dealer inquiries are welcome.

Protomatrix Software Development, the authors of ProCall, announced two new products: ProPrint and ProLink.

ProPrint is a full feature printer driver for WriteMaster users. ProPrint supports Boldfacing, Underlining, Superscripting, and Subscripting on virtually any intelligent printer capable of these operations. There are 3 dedicated versions of the driver: Diablo (for most daisy wheel printers), Epson series, and Okidata Microline series printers. An additional driver is designed to be configured for other printers. According to PSD, customer feedback has been excellent on this product. ProPrint also adds

the ability to command your printer from the command line.

ProPrint is available for C-10's with release 3 or 4 software (version 1.00) and for units with release 5 and above (version 2.00). Please specify when requesting information.

The newest package from PSD is ProLink. ProLink allows your C-10 to receive calls from other systems. With ProLink, you can call-up-use your C-10 over the phone with standard modems. You can even transfer files (ASCII and Binary) using C-10 PCXFER (included). You could set up a C-10 BBS (bulletin board system) and have other users call your C-10 and exchange information and programs.

Other applications include: remote updating of company information or software to several remote C-10 stations from a "master" computer (any computer with ProCall or compatible systems). C-10's can be used for dial up mail drops by executives on the road. PSD will even be providing a special electronic update service to ProLink owners.

ProLink includes utilities to re-boot the C-10 from the keyboard, set and read the time, configure ProLink, and transfer files with calling systems.

ProLink is available for release 5 (and above) C-10's. (It is not available for users with releases 1-4). Inquiries can be directed to:

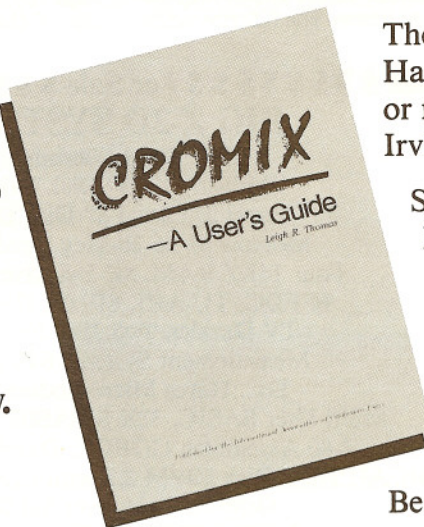
Protomatrix Software Development (PSD)
12564 Connemara Way Sunnyvale, CA
94087 (408) 749-1292
Telex: 503898(Protomatrix) **DD**

Attention CROMIX Users

The book
you've been
expecting is
finally here.

CROMIX

— A User's Guide
can be ordered now.



Leigh Thomas' excellent tutorial on CROMIX, reprinted in the U.S., can now be ordered directly from I/O News.

The price is \$25.00 plus \$4.95 Shipping & Handling per copy. For bulk orders of 10 or more, the price is \$17.75 per copy F.O.B. Irvine, California. California residents add 6% sales tax

Send Check, Money Order, or Credit Card Information to:

I/O News

ATTN: CROMIX — A User's Guide

P.O. Box 17658

Irvine, CA 92713

U.S.A.

Be sure to include Membership Number and full shipping instructions with order. (Amounts noted are in U.S. dollars drawn on U.S. banks, only.)

This is a MUST BOOK for any CROMIX user.

*** Software Sale ***
Save \$250.
 CP/M Software for Cromemco

***CP/M Plus™ (with 60K TPA)** ***Now \$375.**

- Fast efficient disk operation.
- Support for 1-16 drives up to 512 MB ea.
- More than 60K for user programs in banked environment.

***Includes—Expand: a CDOS Emulator,**
 for running Cromemco software under CP/M.

***CP/M 2.2™ for Cromemco** ***Now \$175.**

- Industry standard implementation.
- Multi-disk formats, with 51/4 or 8" drives.
- Fast diskette back-up with copy program.
- Full documentation.

***Includes—Expand: a CDOS Emulator.**

We also sell Hard Disks!

MECA

15 Princess St., Sausalito, CA 94965 (415) 331-6422
 East of the Rockies call: (314) 434-1896

Note: Sale prices for a limited time only. Prices subject to change without notice.

TDRIVE™
 for **CROMEMCO**
 Does it faster!

- TDRIVE emulates a **CROMEMCO** CDOS floppy disk, reading from and writing to bank switched memory boards.
- Speeds up all your disk based programs on **CROMEMCO** micros by 5 to 15 times.
- Expandable, start out with one 64k board—expand to 128, 192 or 224k later.
- TDRIVE is invisible to all system utilities and user application programs.
- Utilizes all your existing and future CDOS software better and faster.
- EASY to install, NO patches or assembly language programming required. Just type TDRIVE.
- TDRIVE saves you TIME (and MONEY)!
- Economical—\$ 98.00—for the TDRIVE-Software only.

See your local dealer or write to:

TESCO GmbH
 P.O.Box 10
 8714 Wiesentheid
 West Germany

Albion Industries
 P.O.Box 7
 Millersville, MD 21108
 USA
 (301) 923-2458

CDOS is a trademark of **CROMEMCO** Inc.
 TDRIVE is a trademark of **TESCO GmbH**,
 West Germany.

Teach Yourself to Program in C

With the advent of the UNIX operating system, a new level of interest in C, the language created by Bell Labs for the writing of UNIX. So, after hearing Mike Turnage give a C class at a recent meeting of the Cromemco Users of Orange County, we asked him to supply us his recommended reading list with comments. His favorites are:

The C Puzzle Book by Alan R. Fever [Prentice-Hall Software Series]

This book offers a series of sample programs, the result or answer, and a detailed, step-by-step explanation of each example. Fever's book will help the beginner understand some of the functions of C.

The UNIX Programming Environment by Brian W. Kernigham & Rob Pike [Prentice-Hall Software Series].

While written to help the user understand how to program using the UNIX shell, this book will also help CROMIX users program in the CROMIX shell. Much of this information can be used with little, or limited modification, and some examples require no changes. Using these programs will allow your system to function better.

The C Programming Language by Brian W. Kernigham & Dennis M. Ritchie [Prentice-Hall Software Series].

This is considered the "Bible" by C programmers. If you confine your C programming concepts to those outlined in this book, most of your code is completely portable between other computers with compilers. This book is a must for any C programmer.

C Programming Guide by Purdam [Que Corporation].

An essential book for the programmer with little knowledge of compiler-type languages, it relates many of the examples to BASIC examples and techniques. This book is designed for beginning C programmers.

C Programmer's Library by Purdam, Leslie, & Stegemoller [Que Corporation].

This book is designed for the software developer and covers, in detail, the concept of creating an installer program. The book also covers memory and disk sort, and offers a complete ISAM routine.

These are Mike Turnage's recommendations for learning to program in C. He assures us that once a programmer learns what these books offer, the CROMIX or UNIX programs will come with ease. Good luck, and let us know what develops.

Current Versions of Cromemco Software

This table lists the current versions of all Cromemco software. It was derived from Cromemco's Software Product Version Report of December 15, 1984. The following notations are used: "NA" implies that the information is not applicable or was not supplied in the product version report. An "*" after the model or release number indicates a preliminary release. Models which have a "D" indicate 68000 software. Almost all software is supplied on both 8 inch and 5 inch diskettes, so the "L" (for large) and "S" (for small) have been omitted from the model numbers. Also, almost all software is supplied on Double Sided, Double Density diskettes. Much of the UNIX software is supplied on tape archive.



MODEL	PACKAGE	RELEASE	VERSION	DATE MASTER CREATED
ANI-D	ANIMATOR (COBOL-D DEBUGGER)	1	NA	10/24/83
AP	ACCOUNTS PAYABLE		02.65	01/11/82
AR	ACCOUNTS RECEIVABLE		02.65	01/11/82
ASM-D	68000 MACRO ASSEMBLER (CROMIX)	2	01.14	02/16/83
BAS-D	68000 BASIC	1	02.10	11/07/83
BAS-X	UNIX 68000 BASIC	1	02.20	09/27/84
C10CPM	C-10 CPM OPERATING SYSTEM	1	02.00	01/17/84
CAMR	CALCMASTER	4	NA	02/29/84
CCC	CROMEMCO 'C' COMPILER	2	05.10	01/04/83
CCC-D	68000 'C' COMPILER	3	02.15	05/17/84
CCC-X	UNIX 'C' COMPILER	1	02.20	09/17/84
CDS	CROMEMCO DIAGNOSTIC SOFTWARE	4	NA	07/15/83
CISAM-D	C-ISAM	1	1.02	09/06/84
COB-D	68000 COBOL COMPILER	2	NA	11/04/83
COLL	CROMEMCO OVERLAY LINKER	3	02.04	03/25/83
CRO-D	68000 CROMIX OPERATING SYSTEM	7	20.63	05/16/84
CRO-X	68000 CROMIX OPERATING SYSTEM-UNIX	2	20.63	09/18/84
CROMIX	Z-80 CROMIX OPERATING SYSTEM	11	11.27	07/03/84
CSPD	C-10 SUPER PACK	6	NA	07/25/84
CTDS-S	68000 TAPE DRIVER SOFTWARE	2	NA	11/14/84
CXDR	CROMIX DRIVER PACKAGE	1	NA	05/18/83
DAZZLER	DAZZLER GRAPHICS SOFTWARE	NA	NA	07/08/80
DBM	DATABASE MANAGER/REPORTER	NA	03.05	01/08/81
DGR	DAZZLER GRAPHICS PACKAGE	NA	NA	07/07/80
DIMR	DISKMASTER	2	01.11	09/08/84
DOS	CDOS OPERATING SYSTEM	12	02.58	11/07/83
FDA	Z-80 MACRO RELOCATING ASSEMBLER	12	03.10	07/18/83
FDB	Z-80 BASIC	11	05.70	03/29/83
FDC	Z-80 COBOL COMPILER	6	04.64	03/29/83
FDF	Z-80 FORTRAN COMPILER	11	03.42	03/30/83
FDG	GAME PROGRAMS	NA	NA	09/04/80
FDR	Z-80 FORTRAN WITH RATFOR	4	01.05	03/29/83
FM2-D	FORMS-2 (COBOL-D FORM GENERATOR)	1	NA	10/24/83
FOMR	FONTMASTER	5	01.16	08/19/83
FOR-D	68000 FORTRAN COMPILER	6	02.15	05/17/83
FOR-X	UNIX FORTRAN COMPILER	1	02.20	09/17/84
FSTBAS-D	68000 FAST BASIC	1	02.10	03/23/84
FSTCCD-D	68000 FAST 'C' COMPILER	2	02.15	07/05/83
FSTFOR-D	68000 FAST FORTRAN COMPILER	2	02.15	07/05/83
FSTPAS-D	68000 FAST PASCAL COMPILER	2	02.15	07/05/83
GL	GENERAL LEDGER PACKAGE	NA	02.61	01/11/82
IDS	IOP DEVELOPMENT SOFTWARE	6	03.00	07/25/83
IN	INVENTORY PACKAGE	NA	02.65	01/11/82
INFX-D	INFORMIX (68000 RELATIONAL DBMS)	1	03.11	04/24/84
INFX-X	INFORMIX FOR UNIX SYSTEMS	1	03.20	09/19/84
KSAM	KSAM FILE ACCESS SYSTEM (CROMIX)	3	01.04	03/01/83
LEX	UNIX WORDPROCESSING PACKAGE	1	NA	10/10/84
LSP	LISP	5	01.08	03/31/83
MAXASM-D	MAXIMIZER MICROCODE ASSEMBLER	1	02.08	11/06/84
NET	C-NET NETWORK SOFTWARE	2	NA	03/20/84
PAS-D	68000 PASCAL COMPILER	5	02.15	05/17/84
PAS-X	UNIX PASCAL COMPILER	1	02.20	09/17/84
RBTE	REMOTE BATCH TERMINAL EMULATOR	5	01.08	11/17/83
RMCOB-X	UNIX COBOL COMPILER	1	NA	10/31/84
RPG	Z-80 RPG II COMPILER	4	03.02	03/31/83
SDDEMO	SDD DEMONSTRATION SOFTWARE	1	NA	01/26/84
SDIDEMO	SDI DEMONSTRATION SOFTWARE	5	NA	04/04/83
SGS	SDI GRAPHICS SOFTWARE	6	02.00	09/06/83
SLMR	SLIDEMASTER GRAPHICS EDITOR	4	02.03	04/26/83
SMCBAS-X	UNIX STRUCTURED BASIC	1	NA	11/06/84
SMDS	SMD DRIVE CONTROLLER SOFTWARE	2	NA	07/06/84
SPICE-D	SPICE CIRCUIT DESIGN SOFTWARE	1	11.02	06/21/84
SPMR	SPELLMASTER SPELL PROOFING PROGRAM	5	01.20	06/27/83
STB	32K STRUCTURED BASIC	11	03.65	03/31/83
STB-D	68000 STRUCTURED BASIC	1	3.65.04D	09/24/84
STMR	STATMASTER STATISTICAL PROGRAMS	2	01.04	07/21/83
TDS	TAPE DRIVE SOFTWARE	4	11.11	04/01/83
TEMR	TELEMASTER COMMUNICATIONS SOFTWARE	2	02.06	04/24/84
TSDI	TRI-SDI GRAPHICS SOFTWARE	3	NA	04/01/83
TSS	TRACE SIMULATOR	NA	02.06	03/06/80
UDST-X	UNIX DOCUMENTATION SOFTWARE TOOLS	1	NA	08/15/84
UFY-X	UNIFY (UNIX RELATIONAL DBMS)	1	NA	11/01/84
ULTRACALC-X	ULTRACALC SPREADSHEET (UNIX)	1	NA	12/15/84
UNIX-X	UNIX OPERATING SYSTEM	1	NA	08/23/84
UPST-X	UNIX PROGRAMMERS SOFTWARE TOOLS	1	NA	09/11/84
WPS	WORD PROCESSING SYSTEM	11	06.00	04/01/83
WRMR	WRITEMASTER WORD PROCESSING SYSTEM	9	00.67	01/09/84

PERSCI

Disk Drive Maintenance AVERAGE 48 HOUR TURN-AROUND

PPS has been providing solutions for PerSci/Cromemco users, user groups, dealers and OEM's for over 3 years.

With over 43 years of combined technical electronics experience, including 12 years on the PerSci payroll, the experts at PPS are uniquely qualified to provide you with the time conscious results that you require for your highly sophisticated disk drives.

Forget the time consuming multiple warranty returns to accomplish what should have been done right the first time!

All disk drives serviced at our lab are tested for a minimum of four hours on a Cromemco CS-3 to insure operational integrity!

On-site services available in the Los Angeles and San Francisco Bay areas. High volume repairs available on-site internationally.

Also, tandon drive repairs and purchase and resale of new and used Cromemco products.

Call **John Bush**, former Supervisor/Lead Technician of Customer Services at PerSci at (714) 861-6649 or (818) 339-5485

PPS

PRACTICAL PERIPHERAL SUPPORT
1531 KIOWA CREST
DIAMOND BAR, CA 91765

FOR SALE CROMEMCO SYSTEM III

11 MB hard disk, 2.4 MB floppy

— Cromix 11.11

— Three Televideo Terminals

— One Data South Printer

MUST SELL . . . BEST OFFER

DAVID PEPER (305) 322-6041

bits & bytes, nibbles & tweaks

10 MHz DPU?

In the process of investigating the purchase of a DPU (so that I can enter the 68000 world), I have had telephonic communications with both Cromemco Technical Services and a regional sales support office. These two sources claim there should be no problem running the DPU (sold at the 8 MHz speed) at the faster 10 MHz speed. All that need be done to convert an older CS-3 is to order the proper crystal. They suggest also installing a new motherboard (rev G) in older machines.

My support dealer, when posed with the same question, agrees with the motherboard replacement, but claims I am asking for trouble if the DPU is run at the faster (10 MHz) speed. The dealer's objections are: (1) Cromemco has not issued a modification order to this effect, so the dealer will not support a DPU at the faster speed, (2) Customers who have tried it have hardware trouble unless the DPU's 68000 and Z80A are replaced with a 68000R10 and Z80B, (3) CROMIX presently will not work with the disk drives if the DPU is run at the faster speed because of drive speed timing problems, (4) Make the switch at your own risk, what works in Cromemco's factory environment sometimes doesn't in a production environment.

I have searched my issues of I/O NEWS for comments made in an earlier issue on the merits of (and reasons for) replacing old motherboards with new ones, but I cannot seem to find where I read the discussion. I would appreciate a reference to it. I would also like to see comments from Cromemco engineers and experienced users on the problems and potentials for speeding up the DPU. It is time to get this issue out in the open. Thank you for your consideration.

Yours truly,
George A. Collier Jr.
Durant, OK

Note: Check Volume III Number 6 in Tec Tips and Volume IV Number 3 in Bits & Bytes.
Ed.

BBS for CDOS—A Noteworthy Response

In Volume 4 Number 2 we ran a query as to the availability of BBS software that runs under CDOS. The same query was posted on the CroNest BBS. Shortly thereafter I received the following message from Lee Heesacker:

"Hi Bill, saw your message on MDM-7xx compatibility with CDOS. As near as I can tell, all CDOS versions are effectively enhanced versions of CP/M 1.4, not 2.2 or

later. Therefore, no CDOS version can support software for CP/M 2.2 or later. Much available software for CP/M is actually compatible with the earlier 1.4 version and also runs under CDOS. However, much of the newest (last 2 or 3 years) CP/M programs are only compatible with version 2.2 or later. All of the CP/M folks are at least that modern now.

I believe that the MDM-7xx programs use some of the system calls that are unique to CP/M 2.2 as well as ignoring the DOS and going directly to I/O ports. None of them work on my versions of CDOS. Its not too tough to get a version of CP/M 2.2 or later running on most Cromemco machines.

That's what I suggest. I use both CP/M 2.2 and CDOS on various occasions. The CDOS is neat, supports most of the software I have, especially the Z-80 Assembler. CP/M is essential for Super-Calc, MDM-7xx and some other stuff. At this point, if I have to choose, I'd constrain myself to CP/M but find it neat to get at some of the unique CDOS software that I have.

Hope this tome helps a bit—sincerely,
Lee"

C-10 BATCH Command: Problem Noted

Jordan Siedband relayed the following information in regard to the BATCH command of the new C-10 CDOS:

"The primary problem with the C-10 is that by making BATCH an intrinsic call in the new CDOS, assembler call to CDOS function 88H, "link to new program" is not implemented when calling BATCH. It is essential that I transfer control from a .com program generated by the C-compiler to call a .cmd file in order to emulate some of the features used in their CROMIX counterparts. Using CDOS 2.58, I have no trouble calling @.com and pass any necessary parameters. This is not possible in the C-10, again because BATCH is now an intrinsic like DIR."

Any Traffic Programs Out There?

We have received an inquiry as to the availability of any "traffic programs" available for Cromemco systems. Our own research failed to turn anything up. If any of you traffic engineers out there are aware of, or use, such programs, we would like to know so that we can pass the information along to the interested parties. Thanks for the help.

Termination of BATCH Command File Execution

Peter Zilahy Ingerman contributed the following useful tidbit:


"I have just finished a careful rereading of the CDOS User's Manual, Section 6.2.1, concerning the @ (BATCH) command.

Nowhere in this section is there a mention of how to stop the execution of a command file, once started, without restarting the machine.

On the other hand, in the description of system call 130 (set user CONTROL-C abort) there is the one sentence paragraph 'If CNTRL-C is disabled, CMD files cannot be aborted by pressing the RETURN key.'

This impresses me as an inexcusably obscure way to document an important capability, namely that of interrupting the execution of a CMD file in an orderly manner."

For CP/M Buffs

MICAH has completed implementation of CP/M 2.2, CP/M Plus, and MP/M for Cromemco hard disks running under the WDI controllers. Demos are being run at MCM Enterprises in Palo Alto. 

NEW BASIC BOOK ✓ AND SOFTWARE ✓

Now you can get a new BASIC software package from Wayne Watson, the author of An Introduction to Structured BASIC for the C-10, published by Macmillan.

The book shows you how to use BASIC effectively, and includes chapters on files, debugging, procedures and much more.

The software package is contained on a single 5-inch disk, and includes a number of useful BASIC programs you can use immediately, including plotting and sorting. Emphasis is placed on C-10 graphics. Programs are completely described and listable.

Book: \$17, BASIC Software: \$45, Book + Software: \$57
Postage & Handling: Add \$3 North America,
\$7 Outside North America

California Residents add 6% tax
Write or call for more information to:



The Software Hill
1857 Apple Tree Lane
Mountain View, CA 94040
(415) 969-4233

CROMEMCO OWNERS UPGRADE TO DOUBLE DENSITY

Hundreds of Cromemco owners have installed the FDCX4 Double Density Upgrade Board and doubled their disk storage. You can, too.

It's easy. The FDCX4 plugs right into your 4FDC board and turns it into a full function double density disk controller.

Some features of the FDCX4 are:

- ★ Analog PLL separator for reliability.
- ★ Write Precompensation. Allows reliable double density operation with all drives (including PerSci's).
- ★ Works with CDOS, CROMIX, and double density CP/M.
- ★ Reads, writes and formats 5" and 8" disks in single or double density. Sizes and densities may be mixed.
- ★ Installs quickly and easily. Just unplug 2 chips from the 4FDC and plug the FDCX4 into the vacated sockets. No soldering is necessary if you use only 5" drives. If 8" drives are used, one solder joint completes the installation.
- ★ Presently in use by Government agencies, Universities, Hospitals, large corporations and small businesses all over the world.
- ★ No risk 15 day trial period.

NEW LOW PRICE!

Price is \$189.00 including shipping. We accept MC, VISA, and AMEX cards. C.O.D. is available only in the USA. California residents include 6% sales tax.

To order, or for more information, write or call:

1601 Fulton Avenue, Suite 10A
Sacramento, CA 95825
(916) 483-0709

CDOS & CROMIX are TMs of Cromemco. CP/M is a TM of Digital Research

 jvb
electronics

In Case You Missed Something . . .

**Back issues of I/O News are still available . . .
\$10⁰⁰ (U.S.)* per issue.**

FEATURES & TOPICS

VOLUME I, NUMBER 1

16 FDC Controller Card
The CROMIX Operating System
The Cromemco Story
CDOS Active Command File
Intro to Computer Graphics
Summagraphics Bit Pad One: Configuring for Use With SDI
Bits & Bytes: System Conversion

VOLUME I, NUMBER 2

Cromemco System Zero
The C-BUS, IOP, and QUADART
Contract Issues for Purchasing a Computer System
Update on CDOS ACF
Structured Programming BASIC
Process Control in Petroleum Industry
Lawyers Service Billing
BASIC Disk File I/O
Announcement of RGB-13 Color Monitor
Intro for PS 8 Power Supply
New Diagnostics Available
Output: Your First Computer Books — BASIC FORTRAN
Bits & Bytes: Shugart Drive Conversion

VOLUME I, NUMBER 3

Cromemco's C Compiler
BASIC String Arrays
Linear Static Analysis of Engineering Structures—Stress
FORTRAN Subroutines
Intro to the C Language
Software Update Service — SUDS
Estimating Taxes — Program
Error Re CDOS Disk Calls

VOLUME I, NUMBER 4

IOP/QUADART Phone Line Communications
Generate KSAM Files Using STD Data Base SCHEMA
Bookkeeping
CDOS Command File Library
Computers in Psychology Lab
PASCAL for CROMIX
CROMIX and Communications Aid Construction Co.
Tec Tips: Old 4FDC Support DS Drives
Check for CRT's and Cables
16FDC Needs Jumper for 20MA OP Cables
Check Power Supply Voltage
Bits & Bytes: Heating Problem Solved
Estimate Taxes and Save (Program Correction)
Table of Cromemco Port Assigns
Graphics on 3355A
3102 Field Repair Notes
Double Density Conversion

VOLUME I, NUMBER 5

WRITEMASTER
Polynomial Interpolation
Using D.C. Hayes Micromodem
Message Utility Under CDOS
Mapping Routines for Floppy Disk Clusters
International Group Treasury System
Tec Tips: Hard Disk Warm Up
16FDC Cramped for Space
64KZ in Hot Systems
Using RDOS Diagnostics
Checking Ribbon Cables
Bits & Bytes: More on Retrofit Fans
CROMIX Utilities Offered

VOLUME I, NUMBER 6

Slidemaster & Fontmaster
Computers in Architecture
COBOL Program to Track Investments
Software Notes
New Enhancements to CROMIX
Encode/Decod for Basic String Functions
COBOL Programming
COBOL Programmers Aid (CPA)
Artwork Graphics and Text (COMANDER I)
Tec Tips: 3102 Has Loose ROMS
3355A Has Self-Test
Z-2H Power Plugs
CROMIX With Hard Disks
Reversing Fans
Use Only 3 Wires on 4FDC Z-4D?
Bits & Bytes: CP/M Screen Editor Found
Trip From Cromemco
SUPERCOPY II

VOLUME II, NUMBER 1

System One Intro at WESCON
Structural Analysis Program (SAP-80)
CP/M Simulator
DP Results on Site at a Footrace
Spool Routine for 32K SBASIC
Extending Your Control Over Applications Software
Cromemco Overlay Linker
RBTE: Software for Binary Synchronous Protocol
Tec Tips: Shorted Tantalum Capacitors
Keyboard Connect to TUART
PerSci 299 Head Damage
Early Rev. 64KZ's & CROMIX
Z-2H Power Plug Problem
Stop Auto Form Feed in CROMIX
Fast vs. Slow Seeks
Priority Interrupt Chaining
Location of 64KZ to WDI
Bits & Bytes: 32K SBASIC File Error: CROMIX
SUDS Review
Special Characters in COBOL

The COBOL Corner: COBOL: Using Segmentation

VOLUME II, NUMBER 2

Cromemco's New European Subsidiary
Overlaying Program & Data in Cromemco 16K BASIC
Emulating CP/M: Under CDOS & CROMIX
System III in Medical Lab
SpellMaster
Planning & Control on Micro
CROMIX Using 16K or 32K BASIC
Input: Shugart vs. Seimans Drives
Output: Group Insurance a Reality
Hybrid Equipment
Tec Tips: Hard Disk Notes
Fast Copy Programs & XFER
Office Static Control
Loose Chips
Stat- Label Features
Fast Memory Chips
Ground Fault Problems
3355 Spinwriter Driver
PRI Revision B
Oscillators on TUARTS
Cleaning Edge Connectors
Bits & Bytes: CROHORTS Building Library
SUDS for COBOL Users
CPMSIM Update
Printer Conflict Resolved

The COBOL Corner: Programming in COBOL

VOLUME II, NUMBER 3

Hard Disk for Systems 2 & 3
Local Area Network for Micros
Supercharge FORTRAN: APU
Implementation of Clock/Calendar Board
Review of dBASE II
Programming in C
Enhancements to RATFOR
Input: CROMIX with CDC 96 Meg Disk
PL/1 Used Under CDOS
Output: Insurance in Force
Tec Tips: Bringing Up Other Terminals
Serial Printers in CROMIX
Termination Resistor Packs
Using Special Printer Features
Bits & Bytes: Statistical Software
CP/M Re-Execution Under CDOS
IDS 88-Modem Modification
SUDS Updates Due

The COBOL Corner: Observations on COBOL 4.60

VOLUME II, NUMBER 4

Cromemco Expands Product Line: 68000 Based Boards
Putting Data Files in Order: Using DBMS
CDOS-CP/M Simulator (GEI)
SCADA: Structural Design Analysis
Parallel Port Adapter (PPA)
How the DPU Works
A Review of Planease
Automated Materials Handling
Input: Bringing Up Other Terminals
Connect REMEX or QUME Drive
Output: Casualty Insurance in Force
Tec Tips: Increase Time on 16FDC Timer
Printer Test Using BASIC
Printer Problems in CROMIX
Special Software Needed?
Bits & Bytes: Statistics Software Emerging
4PIO Boards Revisited
Australian Educational Group

VOLUME II, NUMBER 5

C-10 Unveiled at NCC
Interrupt Processing Tutorial
COGO: Civil Engineering Program
System in Occupational Safety
Micro Based Radar System
Budget Graphics for Z-2D
Input: CROMIX 11.05 & TUART Rev. E
Statistics Software
IFDAS: Data Analysis System
Output: CDOS & CROMIX Drivers
FORTH
Soft Tips: User Memory Under CDOS
Handy Command Files
CROMIX Mode Table
Bits & Bytes: Disk Insertion in 299B Drives
New Games Package
Interface for Diablo Printer
32K Classroom: Absolute Address Cursor Control

VOLUME II, NUMBER 6

256K Card Lowers Memory Cost
Overview of CAD/CAM
An Associative Data Base
Breakthrough in Robotics

*Order from I/O News by Volume & Issue Number. Price includes air mail postage.

Cromemco Intros 8 New Boards: CTI SDD C-Net
DAC-12 ADC-12
Terminal Attributes Thru "C"
For/Next Statements Using Variable Steps
Recovering Erased Disk Files
High Level COBOL Compiler
Variable Expressions for Calculating SBASIC Strings

Input: Initializing Disks Under cdos
Comet-FORTH for CDOS & CROMIX
Removing Tarnish from IC Pins

Output: WESCON & MINI/MICRO '82

Tec Tips: Bringing Up CRTs in CROMIX
Diagnostic Package
RPM Adjustments for Disk Drive
Power Plug in Hard Disk Drives
Using Tape to Test Cards
Ground Straps on Hard Disk
New 64KZ-II

Bits & Bytes: X-ON, X-OFF Protocol Patch
SS Drives & DS Diskettes

32K
Classroom: CRT Terminal Graphic Mode

VOLUME III, NUMBER 1

System Three Gets New Look
Tips on Using Your C-10
An Associative Data Base (Part 2)
Micro Operation w/o Down Time
Conditional for CDOS .CMD File
A New Approach to Statistical Econometric System
Directory Check for FORTRAN
Review of IBM2CPM.COM
New 32K BASIC Book

Input: Printer Form Feed—In BASIC
System 3 Key Problem
Correction to Input
CROMIX Drivers Coming

Output: Watch Your Power

Tec Tips: Serial Printers/TUART/CROMIX
Modems with CROMIX
CPU Selection on WDI-II
PRI Modifications for CROMIX
New C-10: Brief Review
Dead PerSci 299 Drives
Hard Disk Initialization
Repeat/While Loop in 16K
Organizing Files in CROMIX Dir

Soft Tips: Repeat/While Loop in 16K
Organizing Files in CROMIX Dir

32K
Classroom: Single Letter Selection Program
Printing A CRT Display: BASIC

VOLUME III, NUMBER 2

20 Megabyte Disk Now Available
Direct I/O in "C" Using In-Line Assembly Code
32K SBASIC Benchmark Test
Enhancements to the XFER Utility
C-10 Developments Discussed
Complex Arithmetic Library for FORTRAN
Improved Conditional for CDOS
Some Useful Patches for dBASE and Screen
New Cromemco Products
New Cromemco LISP for AI
GETEDIT: Terminal I/O Routine for CDOS & CP/M
Cromemco Intros Statmaster Statistics Program

Input: AS to Halt BASIC Program
Hard Disk Warm-Up Before Boot
Value of Education: Seminars

Output: HDD-5 Index Sensors

Tec Tips: New 5 Inch Hard Disk: 20 Meg
CP/M and CROMIX Compatibility

Soft Tips: Provided Assembler Routines
Margins/Tabs for Screen.COM
Alternative to STARTUP.CMD

Bits & Bytes: EDIT Discoveries
Graphic Library for Cromemco
Help: CROMIX Process Table
Recovering Erased Files

32K
Classroom: Creating a File

VOLUME III, NUMBER 3

Image Processing of Satellite Data with Micros
Comparison of CROMIX and UNIX
Standby UPS Power Systems
More C-10 Developments
Jump Under RDOS or CDOS
X-ON/X-OFF Protocol Patch
Customizing The C-10 Menu
MICROCAD/ME: CAD/CAM for Microcomputers
Interfacing FORTRAN with CDOS

Input: Questions About CROMIX-D

Tec Tips: Serial Printer: CROMIX 11.16
Card Puller
Floppy Disk Controllers
Upgrade PerSci Drives: CS-3

Bits & Bytes: Hotline for QUME Printer Users
Set Internal Clock on C-10
Fontmaster & Other Graphics
New Math Software Offered
Correction to Program
Peculiarity in 16K BASIC
Problem with Foreign Terminal

Inside
CROMIX: Using Version 11.16 SIM.BIN
CMD File: Freeing Disk Space

VOLUME III, NUMBER 4

Micropro Software/IBM Keyboard for C-10
DPU Price Reduced
Growing Pains Eased by Dealer Support: Example
Simultaneous Queued Output to 2 Printers: CROMIX

Input: GRAPHTXT for Fontmaster
C-10 Graphic Character Sets
CROMIX Seminars/dBASE Seminar

Output: Adding 2nd Floppy to C-10

Tec Tips: 2.56 CDOS Hard Disk Bug
Bug in CROMIX 11.16 Typ Driver
What is 3355 Printer?
Dial Up Bulletin Boards
Group Utility
System Programmers Corner
CROMIX 11.16 Update
Handy Command Files: Using 'IF'

Bits & Bytes: Simula for D-Series Cromemco
New Book for WordStar Users
Architectural Software
COBOL Programmers Aide II
Petroleum Library: 68000 Sys
CP/M & SIG/M Libraries: Rent
Graphics Package: *Plot
Equine Management System
Stack Initialization in Assem
C-10 Technical Manual (\$35)

Inside
CROMIX: Running CP/M CDOS Under CROMIX

32K
Classroom: String and File Handling

VOLUME III, NUMBER 5

SDD: TV Camera Interface for Cromemco Systems
CROMIX—A User's Guide
Cromemco 1984: An Interview with Dr. Garland
Using C-10 Computer Ports
Using dBASE II: Setting the System Clock
Software Review: The Menu Generator

Input: Intro to 32K SBASIC for C-10
PL/I
BSTAM Communications Program
Super Calc 2 Under CDOS 2.56
Multiple Printers in CROMIX
Control of Printer Modes
CROMIX Sys Calls to Ren File
Bug in HDTEST with DPU
CDOS Drives on CROMIX Systems
Patch to COBOL Under CROMIX
CROMIX Input & TESTINP Utilities

Bits & Bytes: Screen Patches for H-19
New Products from Cromemco

Inside
CROMIX: RAMDISK

32K
Classroom: Reading CDOS Disk Label

VOLUME III, NUMBER 6

Formatted Input for 32K SBASIC
Software Review: proBOOKS C-10 Accounting System
Close Encounters of the C-10 Kind:
New Column Devoted to C-10
Cromemco Network at Chicago Mercantile Exchange
What is SUDS & Who Needs It?
New Software for the C-10

Input: Response to Need for Statistics Software
Problems with CP/M Simulation
More Suggestions: Book Reviews
Spooling to Two Printers
I/O News Mailing Labels: Renew
Modem in Use at I/O News
CROMIX — A User's Guide
Seminars & Cramps
Insurance: IACU EDP Policy
New RDOS, Boards, Disk Drives
passwd and startup.cmd
Applications Using Spool
Operating System Updates
New Canadian Cromemco Dealers
Cramer Plans Crystallizing

Output: testinp: Fact and Fiction
Management of CROMIX Systems

Tec Tips: testinp: Fact and Fiction
Management of CROMIX Systems

Soft Tips: testinp: Fact and Fiction
Management of CROMIX Systems

Bits & Bytes: testinp: Fact and Fiction
Management of CROMIX Systems

Inside
CROMIX: testinp: Fact and Fiction
Management of CROMIX Systems

32K
Classroom: Procedures to Control Cursor
Use of KSAM in 32K SBASIC

"Cromix"-ize

Your Wordstar & dBase

Tired of living with the CDOS Simulator, and what it does to Wordstar & dBase? Would you like to see your WORDSTAR run REALLY FAST? Could you find applications for fully utilizing CROMIX from within your dBase code? How about terminals and printers tailored to each individual use (either in WORDSTAR or dBase) with seven declarable directories (callable as drives A: through H:)? Then you'll have to call or write to:

T.S.E. Research & Development, Inc.
PO Box 2, Annapolis, MD 21404-0002
Phone 301/263-0958

"CROMEMCO SYSTEMS...THE RIGHT WAY"

Authorized Cromemco I.S.O., dealers
for "c-line" & "Proto-Matrix" products

(WORDSTAR, dBase & CROMIX are registered trademarks, respectively of Micro-Pro International, Ashco-Tate and Cromemco, Inc.)

**We're
Interested!**

We're Really

Interested...in what

you have to say. Especially about how you use your system...the problems encountered and the solutions effected...unusual uses or environments...and any practical applications you would be willing to share with fellow members. These can be short notes for departments like 'bits & bytes...' and 'Tec Tips,' or full feature articles.

Contact Richard Kaye or Lynn Platzek at I/O News for editorial guidelines or assistance. We're interested in unleashing your literary talents.

**BACK
ISSUES**

of I/O News are
available



tec·tips

TEC TIPS is a regular column aimed at providing hints for keeping systems up and running. It will not attempt to deal with specific engineering applications or non-standard configurations. TEC TIPS is edited by Richard Quinn, owner of QUINTEC, a Southern California

Computer service firm.

Using the STDC Hard Disk Controller

The STDC is has been around for several months now but is still undergoing evolution. If you are one of the early users of this card, chances are you have had some problems. Anyway, you might if you go to a new version of your operating system, especially UNIX.

I want to say this before going any further. This article is not intended to skirt issues of reliability with this product but simply to help you understand some of the problems that have come up. Cromemco has for some time had a major problem of slow "lack luster" performance with regards to its software and hardware. Those of us who have been selling have faced this difficulty. They have responded with greater faster hardware like the STDC and CROMIX PLUS (great! great! great!) and given back that old Cromemco feeling. But then they took it one step further and increased the CPU clock speeds, they created the problems I will go into. Anytime you go for performance (whether in cars or airplanes or computers) you have many problems the slow guys don't. I want to encourage the trend toward speed despite the massive upgrade problems we will face. It WILL BE worth it, trust me. (Have I ever lied to you??!!).

Remember, if you're selling only one kind of computer with only one option and you have never had anything else on the market like it (a la Big Blue), you never face the problem of "What do I do with all my old customers, who acquired systems five or even ten years ago, that don't run as well as the new ones coming out of the plant?" You try your best to make your systems run right, but with such a span of years (Cromemco users cover the entire history of micros — no other manufacturer does), it is sometimes impossible. The technology and performance have changed many times over and most Cromemco users are still building on their original system. (I can hardly wait for others to be around for 10 years and see what their computers are like then!) Anyway, enough woes about being the old guy or the block.

New problems have become common place as Cromemco seeks to improve the general performance of their machines. This is especially true of the XPU and UNIX machines. I'm going to try to cover the most common of the problems and relay the solutions I know.

THIS IS IMPORTANT. I don't have all of the answers to these problems. I don't think Cromemco does. Some of what I say may be in error, although I have generally tried to test all of the items discussed herein.

The first problems arise from the

documentation. It is poor, hastily written and totally inaccurate in some areas. To make matters worse, the Revision level of the card you have will determine what is right or wrong.

Enter the priority interrupt chain. This important feature of the card, unlike the WDI hard disk interface card, MUST be in the ordinary interrupt chain with all other cards starting with the 16FDC/64FDC and going through TUARTs, PRIs, IOPs, OCTARTs or the like. Now here is the trick. There are predominantly two revision level cards out there, rev. C and rev. D. The interrupt cables are opposite on these two cards. The revision C card is backwards from all other cards Cromemco has made except the FDCs, which have always been opposite all other cards. That means that Revision C STDC cards, which do not have the priority "IN" and "OUT" labeled, are the same as the 16FDC/64FDC (opposite all other cards). It is easiest to remember YELLOW DOT IS PRIORITY OUT. If your STDC revision C card does not have a yellow dot, pin 1 of J2 is priority "IN." If your STDC is revision D, pin 2 of J2 is priority "IN." For best results, place the STDC as the second in the chain after the FDCs.

All STDC cards have to be jumpered or modified for use with the various CPU cards: the ZPU, DPU or XPU. The revision level of a card will determine what to do, and how much or how little work will be required.

From here on it will get hairy. Lets stick with the Revision C STDC. The instructions in the book, part # 023-2031 are NOT correct for the rev C card. The best source of information for converting this card to work with the XPU, ZPU or DPU is the appendices in the HD 50/21 manual. It is difficult to describe the changes here because you need a picture of the card to see the installation points for capacitors and jumpers.

In addition, the modifications for use with the 10 megahertz XPU is in the process of change even as I write. I don't know where this will end and will update you in the next Tec Tips.

The current mod level for the STDC rev C card is 11. I would not use a card with less than mod level 11. The firmware EPROM is currently 1.20. This has just come out and may affect the UNIX machines more than CROMIX. In general, the CROMIX machines that I have been using are far more reliable than the UNIX machines with this card. Also, the 50 meg hard disk drives seem more reliable than the 21 meg units. This includes the upgraded WDI 20 meg drives. The unreliability is a software problem and not an inherent

problem with the drive.

When you move to the revision D STDC, the book mentioned above becomes accurate, although still not clear. On page three of the manual it shows the jumper set up for use with a ZPU. Cards can be ordered for the particular type of system CPU, but so far we have never received what we ordered and have had to check and make these changes ourselves. Most cards come for use with the DPU card and need to be changed for use with the ZPU cards. Page three shows these changes including the address change from F8h to FAh. I don't know why this is shown under the ZPU changes, but it is not necessary. Address the card as F8, which is the way they come from the factory. (I wonder why they show the change? Maybe earlier software was going to use port FAh??)

So when changing to work with a ZPU, STDC revision D only, make only the three jumper changes shown on page three of the manual. Again, if you have a revision C card, don't look at this book for mods at all. Use the information in the back of the HD 50/21 manual part number 023-9164, appendix A.

For use with CPU's other than the ZPU, the problem grows with revision C. I have seen a revision C STDC work fine with everything from ZPUs to 10MHz XPUs. So it can be done. The revision of the operating system is also important. In general, a card that is set for use with the 10MH XPU will work with lower clock DPUs. In fact, most STDCs seem to be coming set for use with the faster XPUs.

Now that you know this, you think I'll tell you how to set the cards. Wrong. Call Cromemco for the latest on your particular card. I hate doing that, but there is simply no better way. Even as I'm writing, the changes are changing.

When you call, you will need to know the following: 1) the CPU card you are going to use and its' revision; 2) The revision and mod level of the STDC card you are planning to use with the CPU; and 3) know what operating system (and the version) that will be used.

One of the hardware problems that was most frustrating to me in the beginning was caused by a design problem. It seems that the STDC using TI (Texas Instruments) memory chips had a strange habit of losing or dropping data. The problem turned out to be in the refresh of the dynamic RAMS on this card. There was no problem with non-TI memory, but there were strange, and difficult to detect, problems with TI chips. These chips are on the furthest right hand side of the card, and are designated ICs 30, 31, 44, 45, 49, 50, 61 and 62. Make certain that there are no TI chips in your STDC.

The latest revisions, at the time of this writing (this does not matter what CPU card you use), is rev level 11 for revision C cards and rev level 3 for revision D cards. I think both cards will undergo changes in

the next few weeks that will make this information obsolete, in part, by the time you read this. In general, if your machine is a ZPU or 8MHz DPU you will have less problems than the XPU and UNIX machines. UNIX users should be most cautious.

These problems are very important and you should look at these STDC changes with care. If you don't, they will most certainly cause future problems with newer versions of CROMIX and UNIX.

There is one more major area of concern. What do I enter for the various types of drives when running INITSTDC? What drivers do I use? What are partitions and how do I best use them?


I'll cover this in detail next time, as I need to study this more to be comprehensive. But start with the fact that the manuals are not correct in all their details. They are downright wrong in others. Since there are many types of ST-506 drives in various capacities, consult the OEM manuals for number of heads, cylinders, precomp, etc. INITSTDC always defaults to the Cromemco 50 meg drive when it doesn't know what else to do. These values will not work on other drives. I hope I can find this information for next time. In the meantime, call your regional offices or check the manufacturer manuals.

Priority Interrupt Chaining for CROMIX

Because of the confusion in installation of the priority interrupt chain, Cromemco has put "blue dots" and "yellow dots" on the connectors to line things up. There are several problems with this great idea. First, it has only recently begun and hence all older cards are without markings. Secondly, they never say whether a "yellow dot" is priority IN or OUT. So here's the scoop! Blue dots are Priority OUT on FDCs only. Early 64FDCs had no markings as to IN and OUT, but do not differ from their forerunners, the 4FDC and 16FDC. Newer 64FDC cards are marked IN and OUT.

Yellow dots are always priority OUT. This is true of all cards and all revisions. Some cards are now marked with "OUT" and "IN," as well as yellow dots.

The simple rule of thumb is that all cards must go from OUT to IN, starting with the FDCs. I would put the STDC as the second card in the system. OCTARTs and IOPs should be the next cards, with TUARTs and PRIs as the last cards. WDIs never go in the chain. CDOS systems, which don't use most of these cards, don't need any priority cables at all.

One last thing. The current connector is a small black AMP connector, which really holds the pins tight. But you should not just "push it on." It needs to be seated all the way to the bend in the two pin connectors. If you push hard enough to do this, without support behind the connector, you'll likely break the connectors. Support it with a screwdriver, or your finger, behind the pins. I connect the cable before I push the cards in their slots. 

BACK ISSUES

of I/O News are available

QUINTEC

CALL US COLLECT*

for quotes on Cromemco equipment. Give us a chance to match or beat anybody's prices . . . on our dime (sales quotes only, please).

Our expert sales/service/support staff can get you up and running fast.

GET THE BEST, FROM THE BEST.

QUINTEC

SERVICES, INC.

30313 Canwood St. • Agoura, California 91301

(818) 889-4819

*Collect calls accepted within continental U.S. only.

THE C-10 FUN DISK by APPLIED ENVIRONMETRICS

(National Library of Australia card number and ISBN 0 9590809 0 2)

The C-10 FUN DISK is designed as a menu driven package of games, educational programs, utilities and access to the pixel resolution graphics of the C-10. It is intended to assist the business user of the C-10 to obtain maximum benefit for his machine by providing a carefully graded set of lessons in BASIC programming and by providing a key with which to unlock the C-10 graphics. At the same time, the FUN DISK will provide amusement and education for the business person's family through a variety of games offered on the disk.

The FUN DISK menu consists of nine choices:

- 1: HELP
- 2: THE BASIC PRIMER—an introduction to the BASIC language in eight lessons.
- 3: THE BASIC TEACHER—a simple guide to programming.
- 4: CLOCK—sets and displays the C-10 clock.
- 5: Structured Basic programming language.
- 6: GALACTIC WORMS—An exciting game utilizing C-10 Graphics.
- 7: EASEL—allows you to use C-10 graphics.
- 8: Rabbit, Camel, Wumpus or Rotate ; use the Beeper or do sums. — Games programs and educational programs.
- 9: Return to System Disk.

THE C-10 FUN DISK is available for \$100 from:

APPLIED ENVIRONMETRICS
118 Gordon St., Balwyn
Victoria 3103 AUSTRALIA

Close Encounters of the C-10 Kind

Close Encounters of the C-10 Kind is a regular column directed to users of Cromemco's personal computer, the C-10. It is edited by Dr. Tom Beer, of Applied Environmetrics, located at 118 Gordon St., Balwyn, Victoria 3103, Australia. Dr. Beer can be reached by phone during business hours at 8180264, and at home at 802571.

SOFTWARE FOR THE C-10

This column will be devoted to software—that little jumble of hexadecimal squiggles that convert a computer from an inanimate box of chips and plastic to an interactive partner and obedient servant. I am keen to publicize and review good software that is specifically tailored for the C-10, and I am pleased to report that such packages are starting to appear. Noel McIntosh of AID Systems Pty. Ltd. lent me a copy of TYPEQUICK for review. Wayne Watson of The Software Hill sent me his C-10 SOFTWARE PACKAGE, and Rick Townsend of Computer Closet Inc. sent me GRAPH10. I have now evaluated all three of these products and will discuss them, along with the Applied Environmetrics FUN DISK with which I shall be comparing them.

Writing commercial software is a definite art form that many otherwise excellent programmers have not acquired. A programmer is content, and feels that he or she can rest on his or her laurels, if the program works as intended. The user, however, naturally assumes that the program works as intended, and needs to be gently steered in the right direction if he makes a mistake. Let me use Space Glizzard, which appeared in I/O News Volume 4 #2 (page 22) as an example. It is a nice fun program that does what is expected of it. It is not, however, user friendly. You must answer YES in capitals when asked a question. There are no prompts to tell you this and you can only discover it by deciphering the program listing. A naive user can trigger an even more subtle bug. Line 1180 toggles the cursor (escape-Z) after asking its question (do you want to play again?). If you answer the question incorrectly, the question is re-asked but the cursor is now the wrong way around. If you now answer YES, you get a new game with a very annoying cursor flashing around. This is not meant as a criticism of Space Glizzard, which is not being offered as a piece of commercial software. It merely illustrates the dedication, care and orneriness thinking that is required to ensure that the end product is tailored to the frailties of the naive user.

I have arranged my reviews in order of increasing computer sophistication. By this I mean that TYPEQUICK, when it first arrives from the distributor, can be used by someone who knows only enough to boot the computer, insert a disk, and type TQ. The FUN DISK, though menu driven and intended for the same unsophisticated user, relies on three copyrighted Cromemco programs for its operation and thus needs a bit of file copying before you start. The C-10

SOFTWARE PACKAGE and GRAPH10 are both made to work with BASIC so it is most efficient if SBASIC.COM is copied onto the disk, and as is explained below, both these packages are really for people who have some working knowledge of BASIC.

TYPEQUICK

TYPEQUICK is the single most impressive piece of educational software that I have ever seen. The reason for this is that the program makes use of all the wonderful things that a computer can do—but a human typing teacher cannot do—and incorporates them into an interactive set of 10 lessons in touch typing. The program keeps track not only of your typing speed, but also the number of errors you make in hitting each key, and the time to hit each key. Thus after each lesson a little box is displayed that lists the letters used in that lesson, the number of times you hit each key, the number of errors, the overall percentage correct and the overall speed in words per minute. At the beginning of the course you are asked to nominate a speed as a goal for which to aim (I picked a conservative 20wpm). Then at the end of each lesson there is a list of slow keys; a list of keys at half your target speed, and a list of keys typed at target speed or faster.

TYPEQUICK comes with a small manual, called a student guide, an end user license agreement and an impressive sealed disk. The package has an elaborate security system built into it. It arrives with a registered name and number and when you initialize the programs these have to match. Presumably this stops unauthorized users learning on pirated copies. The registered name then appears boldly on each lesson. The student manual also mentions a terminal installation program, but the copy that I received was fully configured for the C-10 and so there was no need for any complicated setting-up.

The course is, apparently written in the C programming language. The only time that the program and I had a minor confrontation was whilst I was typing in my registered name and made a mistake. I hit an arrow key by mistake and had beeping error messages for a few seconds. Nevertheless, the code seems to be well written for the error messages soon disappeared and the system awaited proper input. It is absolutely vital, when writing utility programs for computer neophytes, to have absolutely tight error trapping, and TYPEQUICK passes this test with flying colors. The first six lessons of TYPEQUICK take you through the letters of the keyboard. The next two lessons do the numbers. Lesson 9 is devoted to speed building and was the only one in which I found easy

to fool the course. (Students do that type of thing!). Lesson 9 provides text at a rate just faster than you are actually typing and by trying to keep up with the cursor, without worrying about mistakes, you should be improving your speed. However, as there is no check on whether you are typing in anything even marginally sensible, I whizzed through lesson 9 at a superb 153wpm by holding down the space bar all the time. True, my error rate was a bit large—10Q to be exact—but boy, was I fast. Lesson 10 then brought me down to earth. It was on accuracy improvement. Lessons 11 and 12 repeat lessons 9 and 10 but expect slightly better performances every time. And should you forget one of the earlier lessons then you can always return and redo it. Finally, when you have become an accomplished typist then the manufacturers of TYPEQUICK will send you a beautiful certificate (their words, I haven't seen one yet) in exchange for your disk containing the results of your course.

The results obtained for each lesson, which appear on the screen at the end of the lesson, can also be output on the printer. This leads to the only criticism that I have of the package in regard to C-10 users. It makes no provision for the damnably annoying peculiarities of the standard CLQ printer which produces a gratis carriage-return after every line feed, and will not recognize a whole host of valid ASCII punctuation characters. Thus the result sheet is double spaced and is therefore longer than a single sheet of paper. It means that you cannot get a decent printed result sheet without using fan-fold paper. Hardly a serious shortcoming, but one worth mentioning.

THE C-10 FUN DISK

This is regularly advertised in I/O News, and consists of a single disk which becomes a bootable disk when the Cromemco copyrighted programs MENU, CDOS and SBASIC are added to it. The FUN DISK has 16 lessons of instruction in SBASIC, grouped into two groups of eight (the PRIMER and the TEACHER), a sophisticated graphics program EASEL.COM, a utility CLOCK.COM that sets the C-10 clock, and a bunch of SBASIC games.

The lessons share a number of features with TYPEQUICK. They are personalized and call you by your name, they are elementary and assume minimal prior exposure to computers, and they have been developed by experienced educators so that progress to the next level depends on completion of the previous level. Learning the BASIC language—which is done in the PRIMER—is totally separate from learning programming—which is done in the TEACHER. BASIC is often hard for beginners because these two separate activities are generally combined in most instruction courses.

EASEL is intended to allow simple access to the C-10 pixel graphics. A small cursor appears that can be in DRAW mode, MOVE mode or ERASE mode as it is moved around

the screen by the arrow keys. You draw a picture on the C-10 screen using a 158 by 72 pixel resolution, and save the picture in a file. When driven from the menu, EASEL uses a filename EASEL.PIX as its default, but the user can use any filename for the picture. The use of a COM file means that EASEL pictures can go into a command file and be automatically displayed one after the other. Or, since EASEL permits the easy display of large lettering, you can use you C-10 screen for bold banner advertising. For ease of use, EASEL has an in-built help file that can be displayed if required.

Neither the CLOCK utility nor the games are likely to impress the serious readers of I/O News. The escape sequences for setting the clock have been documented many, many times and can (if you remember them) be issued just as easily from the keyboard as via a program. The main advantage of CLOCK is that it gently prompts you if you cannot remember the codes, and provides error checking to ensure a sensible time is entered. The best of the games, GALACTIC WORMS, is in the same mold as Space Glizzard, though the code is a lot tighter and you have a choice of four speeds including a super fast one. The rest of the games—though fun—do not really make full use of the C-10 capabilities.

C-10 SOFTWARE PACKAGE

The Software Hill is a prolific producer of software for Cromemco systems. Wayne Watson authored the book 'An Introduction to SBASIC for the C-10' and this disk is designed to go along with the book. The book explains SBASIC programming, whereas the programs on the disk provide examples of reasonably long applications programs, all written in SBASIC. Watson's book and disk provide a perfect complement to the BASIC PRIMER and BASIC TEACHER on Applied Environmetric's FUN DISK. These latter two packages are designed for those with no knowledge of computers and programming whatsoever (the BASIC PRIMER begins with an introduction to the keyboard), and give personalized interactive instruction in the vocabulary of the language (PRIMER) and in programming (TEACHER). Watson's book and disk are a perfect follow on and, in fact, are recommended as such in the last lesson of the BASIC TEACHER.

The C-10 SOFTWARE PACKAGE comes on a disk with 41 files on it, of which 12 have the filename extension PRN, indicating that they are printable files containing information and documentation. As their total length comes to 170K bytes it is a fair whack of documentation which includes twenty pages of explanation on the C-10 graphics system. The ancillary programs are arranged in eight groups: Loan Payments, Histograms, Plotting, Record keeping, Graphics, Sorting, Fun and Statistics. The aim is to teach you sufficient BASIC, through your study of the construction of these programs, to enable you to modify them for your own applications. The histograms and the plotting programs are actually very useful in their unmodified form. They do not utilize the fancy C-10 graphics but produce results on the standard 80 by 24 screen. This, of course, makes them eminently suitable for printer output.

A number of the programs do demon-

strate the C-10 high resolution graphics. One program plots a sine curve, another has a group of turtles racing. Notice the reverse emphasis here to the EASEL program on the FUN DISK; EASEL lets you get right into using the C-10 graphics, but offers no clues as to how it is being done. These SBASIC programs teach you all about how to do it, but force you to do it all yourself. Nevertheless, if you want to learn more about programming in SBASIC for the C-10, then the book and disk provide expert advice from a master.

GRAPH10

Towards the end of my column in Volume 4 #1 I mentioned that the only C-10 graphics program of which I was aware was EASEL. Yet straight under my bold assertion was an advertisement for GRAPH10, of which I should have been aware since it had been advertised in the previous few issues as well. Rick Townsend was kind enough not to mention this gaffe when sent me GRAPH10 to review.

GRAPH10 bears some similarities to the Software Hill package in that it is made up of a number of BASIC programs, with a saved version and a listable version of each being provided. GRAPH10 is driven by a menu, which is displayed after BASIC has been loaded and the menu program run. The menu choices follow the eightfold way of:

1. Horizontal and Vertical Lines
2. Draw Screen Graphic Characters
3. Generate Bar Chart
4. Set Clock
5. Animation Demonstration
6. Play Blackjack
7. Help Information
8. End (Returns you to BASIC)

One of the aims of GRAPH10 is to provide a suite of BASIC subroutines for beginning programmers to use in their own programs. The most significant ones are the procedures .HORIZONTAL and .VERTICAL that draw horizontal and vertical lines and .MAKECHAR to position and draw any character from the four inbuilt character sets. The first two menu items demonstrate the use of these procedure calls. If you, dear reader, did not know there were four character sets then immediately take this magazine to your C-10, boot it with the system disk and when the menu is displayed issue the command CHARSETS whereupon you shall perceive the four character sets in their manifold glory.

The animation demonstration is very similar to one in the Software Hill package. Both use the little man character—CHR\$(6) of the boldface character set—and send him moving around the screen. There is not too much more that one can say about the Clock utility, except to note that it does not check for erroneous inputs so that you can have a displayed clock full of punctuation marks. The Fun Disk Clock Utility will not let you get away with this. I also noticed a statement in the documentation of the GRAPH10 Clock Utility which I think is somewhat misleading. To quote: "After the Clock is set it will be displayed on line 25. You do not have to worry about running programs with the clock on because text will never appear on line 25 in BASIC or any other language!" If this leads you to think

that the clock will always be visible then you would be mistaken. Text can be deposited in Line 25 quite easily—provided you know the correct escape sequences—and the clock will then disappear. The clock will, however, return when the message deposit is turned off. On the other hand if the quote was supposed to emphasize that Line 25 is safe from accidental erasure, then it is perfectly correct. Because of its position out of the way of the main screen, all the Fun Disk programs make extensive use of the status line for helpful prompts that can be guaranteed to stay there no matter what foolishness is indulged in by the user.

The two jewels in the GRAPH10 crown are Bargraph and Blackjack. Blackjack is a whopping 24K and will not run under release 4 of the C-10 operating system. As I am still waiting for my Release 5 to arrive I had to use the C-10 as a terminal to a CROMIX system to try out Blackjack. It is a really impressive program that is an excellent demonstration of the C-10 graphics in action. The program assumes that you already know how to play the card game so that help is not offered. In fact, my normally friendly C-10 was turned into a heartless gambling professional intent on wresting all my money and possessions from me. Great fun.

Bargraph is, unfortunately, not quite so successful. I say unfortunately because I notice that this is the main selling point for the package in the I/O News advertisements whereas Blackjack is far and away the best program on the disk. The idea behind Bargraph is to generate a bar graph histogram from a set of data. The data can either be read in from a BASIC DATA statement, keyed in from the keyboard or read in from a CALCMaster PRT file. The idea is admirable and the program works fine if you do everything perfectly correctly. However it lacks the user friendliness and sophisticated error trapping that I would have expected in this type of program. I notice that the version that I was sent is version 1.00 and I have no doubt that some of the bugs in Bargraph will be eliminated in later versions. Nevertheless, Bargraph is still the only program around that will produce a pictorial representation of CALCMaster results direct from CALCMaster computer output, and as such fills a useful niche in the armory of C-10 software.

AVAILABILITY

TYPEQUICK was developed in Australia and can be purchased directly through AID Systems Pty. Ltd., PO Box 216, Chatswood NSW 2067, Australia. It is also available, at a slightly higher price, through US distributors at 12021 Wilshire Blvd -219, Los Angeles, CA 90025. The price depends on where you get it but is about \$85.

C-10 FUN DISK costs \$100 and is available from Applied Environmetrics, 118 Gordon St., Balwyn, Vic 3103 Australia.

The C-10 SOFTWARE PACKAGE is available from The Software Hill, 1857 Appletree Lane, Mountain View, CA 94040, USA. The disk on its own costs \$45 (plus handling charges plus tax) whereas the book plus software combination costs \$57.

GRAPH10 retails for \$74.95 from Computer Closet Inc., 45F Route 303, Valley Cottage, NY 10989, USA.





Inside CROMIX

Inside CROMIX is an open forum on both eight-bit and 16-bit versions of CROMIX. The subject matter is limited to experiences which will help CROMIX users derive more from their systems. Members' contributions are invited.

Inside CROMIX is edited by William E. Jaenicke, Technical Editor of I/O News. Jaenicke has been working with Cromemco systems and CROMIX for more than four years as an independent software consultant. He is available for consultation on CROMIX and can be reached by phone at (714) 955-0432.

Editor's Note:

In Volume 4, No. 2 we presented two articles which dealt with techniques for delaying the execution of a CROMIX process, such as a file backup routine. The methods offered varied in their use of CROMIX system calls, utilities, command files, and additional programming in other languages.

The method which follows, submitted by long-time contributor Jordan Siedband, presents an elegant alternative using the 'C' programming language. If you don't have access to a C compiler, don't despair... the compiled version of this is available thru I/O News (see OUTPUT).

A Method To Make CROMIX Command Files Execute At A Later Time

by Jordan Siedband
(312) 674-1175

It becomes necessary for many clients to print certain reports during the night after the rush of daily business has ceased. Since telephone modems are also busy in this system, it would be desirable to printout, or whatever, at some time, for example, 1 A.M., when we might be reassured that there is not too much computer usage.

The following program will do the trick. It will compile either under Z80-C or 68000c if line 10 is deleted.

The correct procedure is to build a file with the extension '.cmd' wherever you choose. Suppose, for example, the file is named "printout.cmd" and looks like:

```
spool -d test1.out
spool test2.out
ps -al | spool
```

Before leaving the office, at 5 P.M. (17:00), type the following:

```
delay 1:00 printout.cmd&
```

and at 1 A.M. the command file "printout" will commence until it has finished. The program has been set to operate in a 24 hour period only, but could be easily modified to include date as well. Be certain to run the program in detached mode by typing the ampersand (&) or you will not be able to log off. Also, be sure that if the file is not in your directory, the complete pathname is used.

Additional Comments:

LINES 5—6: This is for the sake of the VERSION utility. The magic sequence is FDEDFDED (hex), which is followed by message to be displayed by VERSION.

LINES 7—9: Initialize error message strings ("goof1" and "goof2" are "pointers" to the literal strings).

LINES 12—14: The main function definition. It is passed two arguments (defined in stdio.h). Argc is the "argument count" (an integer), and Argv is an array of pointers which point to the command line arguments.

LINES 16—18: Initialization of additional variables.

LINES 20—24: Checks for correct syntax. There should be three arguments: the command "delay", followed by a time and a command file pathname. If the argument count is not 3, the error messages are printed and the program terminated.

LINES 26—29: Gets the system time. The function "gettime" (from stdio.h) fills the character array "time" with the hours, minutes, and seconds of the system time. These are assigned to the variables i, j, and k, respectively.

LINE 30: Converts the system time into the corresponding value for the number of seconds past midnight.

LINE 31: Copies the second command line argument into the character array "buff". This should be the time specified for the command file to execute.

LINES 32—37: This loop parses the second command and replaces colons with spaces. The variable, j, is a flag to indicate that a replacement was made. If not, a syntax error has occurred.

LINES 38—43: Test the flag, and if not set print the error messages and exit the routine.

```
1  #control ns
2  #include <stdio.h>
3  #control so
4
5  char versn[]={0xFD,0xED,0xFD,0xED,0,0,0,0,0,0};
6  char msg[] = "DELAY UNTIL CLOCK TIMED OUT  Jordan Siedband  12/21/84\r\n";
7  char *ctl = "%s";
8  char *goof1="%c Correct Syntax  delay hh:mm pathname\r\n";
9  char *goof2="%tWhere hh:mm is time to perform activity, pathname of action\r\n";
10 unsigned _stack=0x200;
11
12 main(argc,argv)
13 int  argc;
14 char *argv[];
15 {
16     char buff[10],time[3];
17     int i,j,k,secs;
18     long tt1,tt2,sec1;
19
20     if (argc !=3)
21     {
22         printf(ctl,goof1,7);
23         printf(ctl,goof2);
24         exit(i);
25     }
26     gettime(time);
27     i=time[0];
28     j=time[1];
29     k=time[2];
30     tt1 = 60L*(60L*i+j)+k; /* time in seconds past midnight */
31     strcpy(buff,argv[1]);
32     for(i=j=0;buff[i] != '\0';i++)
33     if (buff[i]!=':')
34     {
35         buff[i]=' ';
36         j=1;
37     }
38     if (j==0)
39     {
40         printf(ctl,goof1,7);
41         printf(ctl,goof2);
42         exit(i);
43     }
44     sscanf(buff,"%d %d",&i,&j);
45     tt2 = 60L*(60L*i+j);
46     if (tt2 < tt1)  tt2 += 86400; /* if less, must be one day more */
47     sec1 = tt2-tt1;
48     secs = sec1 % 30000;
49     k = sec1/30000;
50     if (k) for (i=0;i<k;i++)  sleep(30000);
51     sleep(secs);
52     system(argv[2]);
53 }
54
```


LINE 44: Assigns the hours and minutes of the execution time to the variables "i" and "j", respectively. Note that the syntax for "delay" requires hours and minutes, but not seconds. Uses the "sscanf" function to load the integer values contained in the "buff" character array into the variables addressed by &i and &j.

LINE 45: Computes the number of seconds past midnight of the execution time for the command file.

LINE 46: Adjusts the command file execution time by a days worth of seconds if the execution time is before the system time.

LINES 47-48: Computes the number of seconds that must pass before executing the command file. Line 48 determines the remainder of seconds after division by 30000, using the modulo operator, %. Line 49 computes the number of 30000 second blocks.

LINE 50: A loop that sleeps for 30000 seconds at a time. Loops for the number of times determined in Line 49.

LINE 51: Sleeps the remainder of the time less than 30000 seconds. When this time has been slept away, it is time to execute the command file.

LINE 53: Uses the "system" function (from stdio.h) to execute the specified command file, which is the third argument (argv[2]). The program terminates after execution of the specified command file.



SEE YOUR COMPANY IN I/O NEWS

The Official Publication of The International
Association of Cromemco Users

DISPLAY ADVERTISING RATES

Inside Front Cover, Back Cover, and Inside Back Cover (4-color) \$1,140.00
Full Page 780.00
2/3 Page 600.00
1/2 Page 420.00
1/3 Page 300.00
1/4 Page 230.00
1/6 Page 165.00
1/8 Page 125.00
1/12 Page 85.00

For two-color ads (black & one process color)
add \$200.00 to the rates listed above.

Telephone: (714) 955-0432.

CHANGE OF ADDRESS

Membership # _____

Type or Print

Your Name _____

New Address _____

New area code _____
& phone No. (____) _____

Sign Here _____

Date new address in effect _____

Send address changes to I/O News,
P.O. Box 17658, Irvine, CA 92713.

COMPUTER SPECIALISTS & ASSOCIATES

dSPOOL

Cromix capabilities for the dBase II user! That's dSPOOL from CS&A. Printed output can be spooled or appended to any file, cromix commands can be executed, printer modes modified, even access to the shell are all provided with this handy productivity tool. Clear user's guide and simple installation program are provided. Works with dBase through version 2.4 and Cromix through versions 11.22 or 20.56. Only \$125.

Cromix Seminars

Computer Specialists & Associates (CS&A) will soon be offering seminars on the Cromix Operating System in your area. These seminars, sponsored by your local Cromemco dealer, will expand your knowledge of Cromix and provide you with greater overall control of your system. Separate seminars are held for beginning and advanced users. CS&A's Cromix Utility Disk is included in the suggested \$250 price. Contact your local dealer or CS&A for more details.

dBASE II is a registered trademark of Ashton-Tate
Cromix is a registered trademark of Cromemco, Inc.

16691 GOTHARD ST. • SUITE G • HUNTINGTON BEACH • CA • 92647 • (714) 841-3620

32K Classroom

32K Classroom is a regular column aimed at explaining various programming techniques using 32K Structured BASIC. Users are encouraged to submit examples of their own which may help others in understanding and using this powerful language. Call or write I/O News, c/o 32K Classroom, for details on submitting editorial material.

TecEd Note:

We are pleased to introduce Bernie Thomas as the editor for 32K Classroom. Over the years he has made numerous contributions to this column, and we look forward to more of the same. As to his background, Bernie submitted the following synopsis:

Education: University of Tennessee, Knoxville and Georgia Tech, Atlanta.

Programming Experience: Started on an Apple when 99% of the world thought it was only for sauce and pie. Designed and wrote system to estimate and create bills of material for cabinets and architectural millwork. In 1980, came to Jakes Manufacturing Corp, a material handling manufacturer founded in 1891 in Nashville, Tenn., to design and write a complete system for a Cromemco System Three. The system now has 11 users and includes Purchasing, Inventory Control, Order Entry, Production Scheduling, Engineering Estimates, Bills of Material, Sales Analysis, all Accounting Programs, and several exciting games just to relieve the tension. The system uses the CROMIX Operating System and the programs are written almost entirely in 32K Structured BASIC, making extensive use of KSAM and Library Calls.

Became President of Jakes on September 1 of this year, but continues to serve as Data Processing Manager and am presently expanding the engineering capabilities of the system with an eye on CAD and CAM.

This issue features the first of a two part tutorial in the use of KSAM.

A KSAM MANUAL

The purpose of this manual is to instruct users of 32K Structured BASIC in the use of BASIC-KSAM files. It is assumed that the reader is familiar with the use of the language.

What is KSAM, and how can it help me?

KSAM stands for Keyed Sequential Access Method. It differs from 'ordinary' files in much the same way as an electric saw differs from a hand saw. You can accomplish the same thing with either, but the hand saw requires more time and work.

KSAM can help a programmer quickly perform file handling problems with a minimum of programming. To illustrate the use of KSAM, we will create a KSAM file of names and addresses from an existing 'ordinary' file.

If you don't have such a file, it is suggested that you create one at this time dimensioned as follows.

```
Name$(29),Add$(29),City$(19),State$(1),Zip$(9),Phone$(9)
```

If you total the bytes, you will see that

the RECORD LENGTH is 102. If your total is 96, you have forgotten or are not aware that 32K BASIC begins counting with zero. The actual length of a variable dimensioned as 9 is 10. If you are ever in doubt as to the dimensioned length of a string variable, type `PRINT LEN(Name$(-1))`, using `Name$` as the variable in doubt, and the FULL dimensioned length of the variable will be returned. The use of this `(-1)` is very important as you will discover.

To make it easier to follow the text, rename your file of names and addresses 'Names.dat'. I have found that it is wise to use the extension '.dat' for ordinary files, '.kat' for KSAM files, and '.alt' for ALTER-NATE KSAM files.

The first consideration in Kcreating a KSAM file is what to use as a KEY or Record Number. If the names are going to be used as a mailing list ONLY and not as a customer list, then you might decide to use `Name$+Add$` as the KEY. When the file is read sequentially via the `KGETFWD` instruction, the result will be an ALPHABETICAL listing of the names. Since it is possible to have two names exactly alike in any large list of names, combining the name and address assures a unique key. If you are afraid that you might encounter two people with the same name and street address in two different cities then you can combine the `Name$+Add$+City$` or even `Name$+Add$+Zip$`. If you encounter the same name with the same address in the same city or zip code, then you know you have duplicate names, and KSAM will let you know it as you will see. If your file is a CUSTOMER LIST, then I recommend the use of a CUSTOMER NUMBER even if you or your users never use it.

Let me pause in our discussion of KSAM to expand on this matter of customer or client number since it is a very important consideration. If you have customers, then it is very likely that you are now or soon will be involved in such activities as ORDER ENTRY, INVOICING, or if your list is of VENDORS, writing PURCHASE ORDERS. If you create a file of orders, invoices, or purchase orders, it is never necessary to have more of a reference to the customer or vendor than the SHORTEST POSSIBLE UNIQUE RECORD KEY or customer number. If you never expect to have more than 9,999 customers in the list, then use a four digit number, but if there is any doubt, use a five digit number. When there are natural divisions in the list, such as territory number, you might want to use that as part of the number. For example, 100-0001. This would be Customer 0001 in territory 100. We will discuss this subject in greater detail fur-

ther on in this manual.

For this demonstration, we are going to use a four byte numeric key beginning with 0001. Don't worry if your list is longer than 9,999, we will cover this further along. For this demonstration, we are only going to put 500 or less names in the KSAM file.

We have now determined that RECORD LENGTH is 102 bytes and our KEY LENGTH is 4 bytes. Using the following code we will now KCREATE and build our Names1.kat file from our Names.dat file.

I am assuming that you have never used Name plus a number plus .kat for any other file name in your system. If by chance you have, then you must rename them, or use other file names in the following examples.

LINE 100: Since we are creating this file anew, we will wish to delete a file created by a previous run of this program, and if the file does not exist, the program will advance to the next line.

LINE 110: We now KCREATE the file. When Kcreating a file, you must define two things for KSAM. First the RECORD LENGTH and secondly the KEY LENGTH. You have the option to further specify the unused space per block you wish to reserve, but forget it for the time being. It is not necessary, and most likely you will never use it. Notice the use of the 'K'. Kcreate, and not Create. Kopen, and not Open. (I have often wondered if the Kcreator of KSAM wasn't suffering from a Kold when he Kcreated it. It certainly wasn't a deficiency of Vitamin K.)

LINE 120: Opens the file I/O Channel 1. Note that it is not necessary to specify a record length when you Kopen as you do when you Open an ordinary file.

LINE 130: Opens our existing file Names.dat on Channel 2.

LINE 140: Dimensions our String Variables. LINE 150: If the first name in your ordinary file is in record 0, include this line. If you have reserved record 0 for file information, do not include it.

LINE 200: Increments the ordinary record number by 1 so we will sequentially read the file.

LINE 205: If your file does not have 500 names, then this line will end the program when an ERROR 138, "File Read: No Data", is encountered.

LINE 210: Reads the next record of Names.dat.

LINE 220: Resets the On Error Goto command. This is, of course, necessary at this point since we would not know if an unexpected error was encountered and control transferred to Finish at line 360.

LINE 230: Terminates the program when 500 names have been added to the new file, Names1.kat.

LINE 240: Increments the KEY for our KSAM file by 1 and converts it to a String Variable. THE KEY FOR A KSAM RECORD MUST ALWAYS BE A STRING VARIABLE EVEN IF IT IS A NUMBER SUCH AS 0001. LINE 250—LINE 270: Places leading zeroes before the KEY if the key is a number less



Soft Tips

SOFT TIPS is a regular column aimed at providing software oriented hints and ideas for non-programmers. Members are encouraged to send in tips that can help a user better use his/her system. SOFT TIPS is designed to put forth ideas that are general in nature. The column is edited by Norman Vadnais, President of **Computer Specialists & Associates**, an Orange County Customer Support Specialist. Member's contributions can be sent to SOFT TIPS in care of I/O News. If you wish to discuss your software situation directly with Mr. Vadnais, he can be reached at (714) 841-3620.

ANOTHER HANDY UTILITY

Thanks this issue go to Hassan El-Zayyat for his contribution of a short utility to determine the brand of terminal being used (we have call'd the routine term). This program can be used when a mix of Cromemco and other brand terminals are on a given system.

Term triggers CROMIX's error function to signify a non-Cromemco terminal, so it is designed for use in a command file. The routine would be placed in a command file similar to the following:

```
if -err goto other
%cromemco
screen #1
exit
%other
screena #1
```

SCREEN is the standard screen editor as supplied by Cromemco and SCREENA is a

screen editor modified for the other brand of terminal in use. Everybody could now use one command to edit a file and not have to worry about which terminal they were using.

SYSTEM PROGRAMMERS CORNER

For those of you who dabble in assembly programming, the System Programmers Corner will try to keep you informed and offer you a forum to discuss your findings. This section, however, will only offer operating system type features and hints, versus the latest sorting algorithm. If you have any ideas to contribute to the SPC, please forward them to SOFT TIPS, in care of I/O News.

One area often overlooked by CROMIX programmers are the return parameters of various "update" functions. As an example, look at the content of the **term** routine as

listed below. Close examination of the CROMIX manual reveals that when changing the modes of a device CROMIX returns the previous setting to the users. This saves having to "get" the settings before you "set" the new ones (as is done in our contributed program). I hope this will save you a few lines of extra code.

A VIABLE FORUM?

I have always expressed an interest in receiving input from readers for items of interest for these SOFT TIPS columns. It is important that the I/O NEWS become a forum for information and ideas for Cromemco users of all persuasions. Again I would like to plead with you to supply SOFT TIPS and/or I/O NEWS with any ideas, articles, program listings, and the like that you would be willing to share with others.

Information can be sent via mail, telephoned in, or transferred via modem (please call first). SOFT TIPS could benefit from short routines or command files as above or other general use information. I am personally interested in hearing about any bugs that may arise in Cromemco software, to inform other possible users and to present the bugs as a group to the engineers at Cromemco. Please help us serve you by pitching in!

Continued ►

than 1000. This is necessary to keep the records in a strict numeric sequence. It is possible to use merely "1" as the KEY even though our key length is four bytes, but the numeric sequence would not be correct.

LINE 280: Adds the next record to our KSAM file. Note the use of the (-1). This is absolutely necessary, unless your variables always contain the number of bytes defined in the dimension statement. An exception would be, if every name in your list was 30 bytes long or if you have padded them with trailing spaces to expand them to the dimensioned length. In the case of KEYS, the (-1) is not necessary since lines 250 thru 270 have insured that the length of Key\$ is 4. The same is true with State\$: it will always be a two-character abbreviation, so the (-1) is not required.

LINE 290: Prints Key\$ to the terminal just to let us know how the program is progressing.

LINE 300: Transfers control back to line 200, the beginning of our loop.

LINE 400: Closes both files and terminates the program. The command 'Close' will close all open files even if they are KSAM. However, if you wish to close a specific KSAM file, you must use KCLOSE. For example, Kclose \1 .

Names.kat will now become the MASTER FILE, and all other files which we Kcreate will carry only a KEY from this file as its' records. In the next installment I will illustrate this by presenting a program to Kcreate a MAILING LIST by ascending zip code order.

CD

```
100 On Error Goto 110: Erase "Names1.kat"
110 On Error Stop: Kcreate\102,4\"Names.kat"
120 Kopen\1\"Names1.kat"
130 Open\2,102\"Names.dat"
140 Dim Name$(29),Add$(29),City$(19),State$(1),Zip$(9),Phone$(9)
200 Rec'no=Rec'no+1
205 On Error Goto Finish
210 Get\2,Rec'no\Name$,Add$,City$,State$,Zip$,Phone$
220 On Error Stop
230 If Rec'no=501 Then Goto Finish
240 Key=Key+1:Key$=Str$(Key)
250 If Len(Key$) < 4 Then Do
260 K$="0000":E=3-Len(Key$):K$=K$(0,E)+Key$:Key$=K$
270 Enddo
280 Kadd\1,Key$\Name$(-1),Add$(-1),City$(-1),State$,Zip$(-1),Phone$(-1)
290 @ Key$
300 Goto 200
400 *Finish: Close: Stop
```

MCM

MCM Enterprises

A Full Service Cromemco Dealership

featuring:

ProCall

The Unique
Communications/Modem Package
for your

C-10 and S100 Cromemco Systems

- ☐ On-site Service
- ☐ Consulting
- ☐ Personalized Training on CDOS, CROMIX, and Languages

215 Hamilton Avenue
Palo Alto, CA 94301
(415) 327-8080


```

0001 ;This program tests to see if the connected terminal is a Cromemco
0002 ;terminal. It sends a ^E (control-E) to stdout and checks for a
0003 ;response on stdin. If one is received it assumes that it is connected
0004 ;to a Cromemco terminal and exits with no error set. If none is
0005 ;received the error flag is set before exiting; thus a shell command
0006 ;can run this program and if an error condition is returned, assume
0007 ;that the attached terminal is not a Cromemco.
0008 ;
0009 ;
0010 ;The jsys and mode equate files are located in the /g directory (G: to CDOS)
0011 ;
0012 *INCLUDE G:MODEEQU.Z80
0013 ;***** end of include *****
0180 *INCLUDE G:JSYSZ80.Z80
0014 ;***** end of include *****
0426 ;
0427 CTRL_E EQU 5
0428 ;
0429 START:
0430 ;
0431 ; Get current Mode for RAW and ECHO
0432 ;
0433 LD B,STDIN
0434 LD C,MD_MODE1
0435 JSYS .GETMODE
0436 JR C,ERROR
0437 ;
0438 ; Save it..
0439 ;
0440 LD A,D
0441 LD (CURR_MODE),A
0442 ;
0443 ; Set Mode to RAW, -ECHO
0444 ;
0445 LD E,^ECHO!^RAW
0446 LD D,^RAW
0447 JSYS .SETHMODE
0448 JR C,ERROR
0449 ;
0450 ; Send ^E to terminal..
0451 ;
0452 LD A,CTRL_E
0453 LD B,STDOUT
0454 JSYS .WRBYTE
0455 JR C,ERROR
0456 ;
0457 ; Check for response..
0458 ;
0459 TEST: LD B,STDIN
0460 LD C,MD_STATUS
0461 CALL WAIT
0462 JSYS .GETMODE
0463 ;
0464 ;
0465 ;
0466 ; No response, not a Cromemco terminal..
0467 ; Set error and exit.
0468 ;
0469 JR Z,ERR_EXIT
0470 ;
0471 ; Response: must be a Cromemco terminal..
0472 ; read 6 bytes sent by terminal in response to ^E.
0473 ; ("B"BC-10" in case of C-10)
0474 ;
0475 LD C,6
0476 JSYS .ROBYTE
0477 JR C,ERROR
0478 DEC C
0479 NZ,LOOP
0480 ;
0481 LD HL,0 ;set non-error condition..
0482 JR ;...and exit.
0483 ;
0484 ; Not a Cromemco terminal...
0485 ;
0486 ERR_EXIT:
0487 LD HL,1 ;set error condition..
0488 JR ;...and exit
0489 ;
0490 ; Come here in case of errors
0491 ;
0492 ERROR: LD B,STDERR
0493 JSYS .ERROR
0494 ;
0495 ; Restore Mode RAW and ECHO
0496 ; before quitting
0497 ;
0498 LD C,MD_MODE1
0499 LD E,^RAW!^ECHO
0500 LD A,(CURR_MODE)
0501 LD D,A
0502 LD B,STDIN
0503 JSYS .SETHMODE
0504 JSYS .EXIT
0505 ;
0506 ;
0507 ; Delay to give time to terminal to respond..
0508 ;
0509 WAIT: LD DE,0FFFH
0510 WT_LOOP:
0511 DEC DE
0512 LD A,E
0513 OR A,D
0514 JR NZ,WT_LOOP
0515 RET
0516 ;
0517 CURR_MODE:
0518 DS 1
0519 ;
0520 END START

```

New Bulletin Board For Cromemco Users

by Kenyon Swartwout

Have you ever asked:

Where can I get software for my application that will run on CDOS (or CROMIX)?

Where can I find hardware that will work with my Cromemco system that will meet my special requirements?

I am having problems with my equipment and don't know where to go to get help. What can I do?

How can I sell my gizmo? It works OK, but I've upgraded my equipment and no longer need it.

If you have ever asked any of these or similar questions, a new Bulletin Board just announced by Professional Data Systems, Inc. of Phoenix, Arizona may be your answer.

It is really much more than just a bulletin board. The user can also send mail to other users as well as to persons that have

placed bulletins on the system. Specifically, you may:

1. Read or originate bulletins for any one of four bulletin boards:

Software
Hardware
Technical
Miscellaneous

2. Delete any bulletin that you have entered.

3. Send mail to the originator of a bulletin. The letter will automatically be addressed to the originator. It's as simple as typing the letter and then pressing a key to send it.

4. Send mail to any other person that is on the system, providing you know his ID number.

5. Answer mail sent to you by just typing your answer. Your letter will automatically be addressed to the sender.

Some of the other features are:

Your identity is kept confidential unless you choose to make it known. The only information others know about you is your ID number.

Any time that you are asked for an input, you may type a '?' and you will receive 'help' information for that part of the program.

Long messages will stop when the screen is full. You have the ability, however, to let the message run continuously. This is very useful when capturing the message for later review or when printing the message as it appears.

When you join the system, you are assigned an ID number and a password. The password may be changed by you at any time. When you first log in, if any mail has been sent to you, you will be so informed. Next, the following statement will appear:

Please enter a command or <CR> for Command List == >

If you know the commands, you may enter a command at this point to read, write or delete a bulletin or to send or read mail. If you are not sure of the command, merely press RETURN or ENTER and the following menu which lists all of the commands will appear:

COMMAND LIST

Read: RHB RSB RTB RMB
Write: WHB WSB WTB WMB
Delete: DHB DSB DTB DMB
RM Read Mail
SM Send Mail
CL Command List
CP Change Password
CS Toggles continuous scrolling ON or OFF

? for help

B, E or X to EXIT

Enter Command followed by <CR> == >

You may enter commands from any part of the program when asked for a command input. It is not necessary to return to the menu, although you may view the menu by merely pressing RETURN instead of entering a command.

Any time that you are asked for an input, you may type a '?' and you will receive 'help' information for that part of the program.

About The Program And The Equipment It is Running On

The bulletin board program was written in Z80 'C'. Actually, the program consists of nearly 50 separate 'C' programs linked together to form the main program.

The program is running on a Z2H system with a complete standby Z2H that can quickly be put on line in case of equipment failure.

The entire system runs on an uninterruptible power supply to isolate it from power line surges and to keep the system running in case of power failure. The battery back-up feature provides more than six hours of stand-by power.

Your call to the system is handled by multiple phone lines. You will seldom receive a busy signal. Both 300 and 1200 baud are available. While this particular bulletin board is new, a similar program has been running on this same equipment without interruption for nearly three years.

Are There Any Charges?

Professional Data Systems, Inc. is making a modest charge for anyone desiring to use the Bulletin Board. This is to cover the actual cost of operating and maintaining the system.

The first 100 that sign up will be charged a one-time installation fee of \$25.00 plus a \$5.00 monthly charge with one year paid in advance. Therefore, for a charge of \$85.00 you will be on the system for one year.

This fee will provide unlimited access time to the system. Unlike other services, there is no fee difference between the 300 baud lines and the 1200 baud lines.

After the first 100, it is anticipated that there will be an increase in the monthly fee.

the program consists of nearly 50 separate 'C' programs linked together to form the main program.

HOW DO I SIGN UP?

You may sign up in one of three ways:

1. Send your check for \$85.00 to:

Professional Data Systems
4506-A North 16th Street
Phoenix, AZ 85016

2. Phone Professional Data Systems at (602)265-6656.

3. Dial into a demo program to see how it works. To access the demo program, dial (602)234-0553. When the computer answers, press RETURN until 'Login:' appears. If 'Password:' appears, press RETURN again and you will see 'Login:'. Then type BBDEMO in either upper or lower case letters. You will enter the demo program immediately without being asked for a password.

The demo program will allow you to read bulletins that are on the demo system. You will not be able to write bulletins of your own or send or receive mail.

When you exit the demo program by typing X, E or B you will be asked if you want to sign up. If you do, you can provide all of the information, including a Master Card or Visa Card number while you are in the demo program.

Whichever day you chose, you will be sent

The Cromemco User's Bulletin Board should provide a missing link for Cromemco users and dealers that often have a difficult time finding answers to their many questions.

complete instructions, together with your ID number and initial password within approximately five days.

The Cromemco User's Bulletin Board should provide a missing link for Cromemco users and dealers that often have a difficult time finding answers to their many questions.

ABOUT THE AUTHOR:

Mr. Kenyon Swartwout is an independent consultant retained by Professional Data

Systems of Phoenix, Arizona. He is a graduate of Case-Western Reserve University and has been president of a company that introduced the first electronic process control system to the chemical and refining industries. More recently, he headed an audiovisual firm that produced sales, public relations and training films as well as TV spots for commercial and industrial clients.

Swartwout has been active in electronics and the computer industry for nearly 40 years with experience in hardware, software and systems analysis. Currently, he provides management consultation and programming for Professional Data Systems.

DD

**Become a Member of The
I.A.C.U. and have I/O News
Sent Directly to You.**

CLASSIFIED ADS

ADVERTISER INDEX

FOR SALE

Z2H, Only 1 DSDD Floppy, 256K, ZPU, TUART, 16FDC & WDI Boards, Hazeltine 1420 Terminal, Cables & Software. Consider any reasonable offer. Freight not included. (609) 629-8579 Mitch.

FOR SALE

Cromemco/NEC 3555A Spinwriter printer, bi-directional, excellent condition, supply of ribbons, \$1,100.00. Contact Andrew Kushner, Esquire, 609-858-7011.

★ ★ ★ FOR SALE ★ ★ ★ CROMEMCO SYSTEM THREE

Dual Persci 277 Disk Drives (8")
1 — 4FDC Floppy Disc Controller
1 — 64KZ RAM
1 — PRI
1 — ZPU
1 — Beehive DM10 Terminal
1 — Texas Instruments Model 810 Printer
Price \$3,500 or BEST OFFER

Please Contact: Richard Thomas
Office: 801-363-8817
Home: 801-942-2205

FOR SALE

Cromemco System III: two 5 1/4" double sided floppy disk drives, one 35 mg. hard disk drive with rapid access which is less than 3 months old, 11.26 Cromix, four Cromemco 3102 terminals, four Cromemco memory boards, one tu-art and one quadart IOP, one Z80 processor board, numerous software programs. This system is in like-new condition. Make offer. For further information, call (803) 238-0421 or (803) 238-5654 or write Asbury H. Williams, M.D., P.O. Box 14340, Surfside Beach, South Carolina 29587.

FOR SALE
SYSTEM THREE
Z80, 64K, 16FDC
CDOS, Assembler, Word Proc.,
I/O News, 3779 Printer, ADM3-A
\$2500 or best offer
215/688-7080

— FOR SALE —

Cromemco System 3, Cromemco 3102 terminal NEC Ltr Quality Prt (3355A), 2-8" DS/DD drives with Wordstar, Cobol and more. The system is completely functional and like-new.
Asking \$5445

Contact Jim McPherson at (415) 962-6883

FOR SALE CROMEMCO SYSTEM III

ZPU, 64KZ, 16FDC, PRI boards, 4 — PerSci 299B drives (4.8 Mb total), 3102 terminal, 3703 printer, Z3-MDSK desk. Database, Word-processing and Real Estate software.

\$3000/obo
(517) 332-3700/676-9656

Our Loss/Your Gain

Business move necessitates quick sale.

- Cromemco multi-user system (256K, 20M-HD, 1 flpy 5 1/4", 4 user capability)
- Cromix operating system (accepts all popular programming languages)
- 2 Visual 50 terminals
- T/Maker and Milestone CPM software

Call for price and details:
Tim Jones (509) 747-4171

FOR SALE:

Cromemco Z2 D, 64K, two DD/DD 5 1/4" drives,
Centronics parallel interface board
Hazeltine 1500 terminal
DBII, Wordstaff, 16K & 32K Basic software
All manuals for hardware and software

Barnes & Associates
7700 Edgewater Drive, Suite 651
Oakland, CA 94621
(415) 562-8822

FOR SALE

Cromemco CS3 SN/21370, ZPU, 64KZ, PRI, 4FDC with JVB Electronics X 4FDC, 8" drives, 3355 daisy wheel printer SN/34675 with tractor, adds viewpoint terminal SN696483.

Price \$4000/obo
Ask for Bob 8-5 CDT (918) 494-0464
After 6 (918) 366-7572

FOR SALE 3355A PRINTER

BEST OFFER

Steve Tinsley
(317) 637-7243

NEW SYSTEMS FOR SALE

Brand new, still in box Cromemco System One, with 256K RAM, DPU and 20Mb hard disk + C-10SP personal computer and software. Only \$5200.

Call (818) 705-7535 day or night.

ACKERMAN DIGITAL SYSTEMS, INC. Pg. 11
Prom programmer

APPLIED ENVIRONMETRICS Pg. 21
Features the C-10 Fun Disk: a menu driven package of games, educational programs, utilities, etc.

CLASSIFIED ADVERTISEMENTS Pg. 30

COMPUTER SPECIALISTS AND ASSOCIATES Pg. 25
CROMIX capabilities for the dBASE II user: dSPOOL

CROMEMCO, INC. Back Cover
UNIX System V

GUNN ENTERPRISES, INC. Pg. 3
Factory authorized Cromemco dealer featuring turnkey systems and offering custom packages.

JVB ELECTRONICS Pg. 17
Double your disk storage by upgrading your Cromemco with the FDCX4 Double Density Board.

MCM ENTERPRISES Pg. 27
Features ProCall, a communications/modem package for the C-10 and S-100 Cromemco systems.

MICAH Pg. 15
CP/M software for Cromemco

PRACTICAL PERIPHERAL SUPPORT Pg. 16
PerSci disk drive maintenance

QUINTEC SERVICES, INC. Pg. 21
Features creative hardware/software products and solutions.

THE SOFTWARE HILL Pg. 17
"An Introduction to Structured BASIC for the C-10," a book on how to use BASIC effectively.

SOFTWARE STANDARDS, INC. Pg. 11
RealWorld accounting, dB compiler (dBasell compiler), VT100 and VT52 emulators: new software packages for 68000 and Z80 CROMIX.

SYSTEMS ATLANTA, INC. Pg. 2
Floppy and hard disk subsystems

THE TELEVISION COMPANY Pg. 13
Big Z-2D Cromemco system for sale

TESCO GMBH Pg. 15
TDrive: emulates a Cromemco CDOS floppy disk, reading from and writing to bank switched memory boards.

TREXIS, INC. Pg. 34
PerSci repair and C-10 graphics

Local Cromemco User's Groups

Arizona Association of Cromemco Users

Contact: Jo Ann Drake, President
2207 West Eugie Avenue
Phoenix, AZ 85029
(602) 993-9589

Australia User's Group*

Contact: Minicomp
Minicomp Building
104 Mount Street
North Sydney, NSW 2060
Australia
(02) 957-6800
Meets monthly
*Publishes "Minicomp/Cromemco" a monthly newsletter

Bay Area Cromemco Users & Programmers (BACUP)

Contact: Raymond Barglow or Alan Walworth
United Word & Data Processing
2345 Fulton Street
Berkeley, CA 94704
(415) 841-0708 or (415) 548-2692

Cromemcohorts

Contact: Dr. Brent Lowensohn
4747 Sunset Blvd.
Los Angeles, CA 90027
(213) 667-8972

Cromemco Users' Group Holland (CUGH)

Contact: Joop Kohler, Secretary
P.O. Box 120
2910 AC Nieuwerkerk a/d IJssel
The Netherlands 01803 - 3300

Cromemco Users' Group

Contact: Peter Norman
The University of Newcastle Upon Tyne
Department of Chemical Engineering
Merz Court, Claremont Road
Newcastle Upon Tyne NE1 7RU
England
Newcastle 28511, Ext. 3278
*Publishes Cromemco Users' Newsletter (CUG)

Cromemco Users' Group Ontario, Canada

Contact: Lloyd Parker
Hiram Walker Resources Ltd.
Suite 600
1 First Canadian Place
Toronto, Ontario
Canada M5X 1A9
(416) 864-3349

Cromemco Users of Orange County, California

Contact: Michael Peterson
Accountability Systems
700 South Tustin Avenue
Suite B
Orange, CA 92667
(714) 639-4570
Meets third Tuesday Monthly

Insistems Pty. Ltd.*

Contact: Norman Rosenbaum
337 Moray Street
South Melbourne, Victoria
3205 Australia
(03) 690-2899, telex AA30458
*Publishes "Cromemco UPDATE"
a bi-monthly newsletter

Illinois Users' Group

Contact: Jim Knowles
P.O. Box 631
Elgin, IL 60120
(312) 695-7775

Indonesian Cromemco Users' Group (ICUG)*

Contact: Zafir M.A. Pontoh
Computation Lab
Department of Regional & City Planning
Bandung Institute of Technology
10 Ganesha
Bandung, Indonesia
(022) 82051 ext. 360
*Publishes "BERKALA ICUG,"
a monthly newsletter

Microcomputer Users' Group

Contact: Jim Lenz
1165 Barbara Drive
Cherry Hill, NJ 08003
(609) 428-6701

Northwest Association of Cromemco Users (NWACU)

Contact: Jim Illman
403 S. Brandon
Seattle, WA 98108
(206) 763-2099

North San Diego County Users' Group

Contact: Charles Mackey
P.O. Box 397
Fallbrook, CA 92028
(619) 728-6116
Located 30 mi. east of Oceanside

North Texas Cromemco Commercial Users' Group

Contact: Jerrell Johnson
1131 Winterwood
Lewisville, TX 75067
(214) 221-1437
Or call Rocky Hall
@ (214) 398-1595
Meets first Wednesday bi-monthly

NY, NY Users' Group

Contact: Charles Perrella
45F Route 303
Valley Cottage, NY 10989
(914) 268-5137

SaCromemco Users

Contact: Alan Whitman
Box 244
Rancho Cordova, CA 95670
(916) 635-6070

Silicon Valley Cromemco Users

Contact: Alan O'Neill
(415) 969-3854 or Emily Ott (415) 854-5818
Meeting place provided by:
MCM Enterprises
215 Hamilton Avenue
Palo Alto, CA 94301
Meets Fourth Tuesday monthly

W.A. Cromemco Users' Group

Contact: Rae Canning
c/o The W.A. School of Computing
2/294, Rokeby Road
Subiaco, Western Australia 6008

West Germany Users' Group

Contact: Glynnis Long
Tesco GmbH
P.O. Box 10
8714 Weisenthied
West Germany
09383-1237
Total fluency in English & German

Wisconsin Cromemco Users' Group

Contact: Bob Ungemach
6249 West Browndeer Road
Browndeer, WI 53223
(414) 355-1451

Commercial Member Listing

Special Memberships are open to authorized Dealers and OEMs only. These memberships cost \$350 per year, and entitle the member to a special listing on the Association's Referral Service Data Base, as well as this printed listing.

North America

Western United States

ACCOUNTABILITY SYSTEMS
700 South Tustin Avenue, Suite B
Orange, CA 92667
(714) 639-4570

An exclusive Cromemco dealership, Accountability Systems caters to the growing business and industrial base in Southern California. The Orange office supports the new personal computer system. Classroom training is available at both locations. CROMIX and Communication specialists. Developers of a professional medical billing package that can be used in single or multi-medical offices. The package provides full accounting for the medical office including monthly Patient Statements, Medicare & Medi-Cal Forms and Standard Insurance. Complete Business Accounting software that is customizable.

Orange Office:

Key Personnel: Michael L. Peterson, Systems Analyst
Kathleen Peterson, Office Manager
Pat McGuire, Jr., Software Systems
Bruce Hughes, CPA, Acctg. Consultant

EXCALIBUR COMPUTERS
4558 Auburn Blvd., Suite 191
Sacramento, CA 95841
(916) 972-9252

Complete Systems house providing Sales, Service, Warranty Repair and Support for Cromemco Products. Custom Software developed in-house. Training available for CDOS, Cromix and Languages, as well as hardware. Has developed a Medical Billing Package and an Attorney Billing Package written in 32K Structured Basic. Market Cromix Drivers to implement concurrency on various different terminals.

Key Personnel: Robert Brown, Sales and Marketing
Curt Johnson, Systems Engineer
Jon Aimone, Software Support
Charles Stevenson, Design Engineer
Daniel Brown, Customer Support

Major Market Area: Sacramento, extending into Northern California

MCM ENTERPRISES
215 Hamilton Ave.
Palo Alto, CA 94301
(415) 327-8080
(415) 493-3333

Sales, Service, Integration, Installation, and Innovation — these are key words to describe MCM Enterprises. MCM is a full service computer solutions company with consulting, equipment, software, training, and service. MCM carries a full line of Cromemco Systems, NEC, Epson & Okidata Printers, Lear Tristar, Peachtree, Micropro (the WordStar People), ProCall Communications Software, and other specialized software. MCM Enterprises also offers full service on NEC Spinwriters, PerSci floppy drives, and all Cromemco equipment. MCM offers a variety of equipment and program service agreements. MCM also custom configures systems for international power requirements and has full export services. Call for training on CDOS, Cromix and languages, as well as hardware.

Key Personnel: M.C. Merchant (MSEE), Owner
T. Bidstrup, Sales
M. Ridgway (MS), Program Service
B. Blaylock, Equipment Service
M. Nadair (MSEE), Mgr. Paris Office

Major Market Area:
Sales: San Francisco Peninsula & Nevada extending

internationally.

Service: S.F. Peninsula and Nevada extending into N. California.

Paris Office: 4 Rue Paul Bert
92150 Suresnes, France
Tel (1) 506 33 03 TLX 610994F

MULTI-MEDIA VIDEO INC.
3350 Scott Blvd., Bldg. 21
Santa Clara, Ca. 95051
Tel: (408) 727-1733
Tlx: 171-577 MMV USA

Multi-Media Video, (MMV), markets bilingual Arabic/English Cromemco systems and peripherals throughout the Middle East. Installations have been made in the government and banking sectors; a complete Arabic banking system was developed for the latter.

Key Personnel: Ursula Burger, President
Michael Laugesen, Sales Manager
Clarissa Clayton, Marketing Manager

Major Market Area: Authorized dealers in Egypt, Saudi Arabia, and Pakistan.

Mid United States

ASGARD COMPUTING EQUIPMENT, INC.
121 West 6th Street
Neillsville, WI 54456
(715) 743-3344
823 5th Street
Menominee, MI 49858
(906) 863-6733

Exclusive Cromemco dealer with long term Cromemco association. Office includes on staff Engineers, Accountants & Chemists.

Key Personnel: James L. Bailey, President
Jerry Hagen, Vice President/P.E.
Ed Baetke, Secretary/Treasurer/Chemist

Major Marketing Area: Upper peninsula in MI, Northern & Western WI, Eastern MI.

COMPUTER CROSSROADS OF AMERICA, INC.
6 Terrace Shopping Center
Richardson, Texas 75081
(214) 231-6108 Twx/Telex 4991118

We are a CROMEMCO MASTER DEALER engaged in DEALER and OEM sales, service and support. We are in the top twenty-five dealers in the U.S. We have a consulting staff comprised of specialists in hardware, software and applications engineering. We are presently engaged in sales from the hardware level (equipment and/or software delivered in an unopened box) through the complete systems level where we take full responsibility for the system hardware configuration, instruction and maintenance of a system. As our name implies THIS IS THE CROSSROADS WHERE IT ALL COMES TOGETHER.

Key Personnel: Ed Fearon, Sales & Support
Danney Jarman, Sales & Support
Mark Shepherd, Sales
Bill Carnahan, Support

Major Market Area: Sales & Service Worldwide

TRADEWIND SYSTEMS
Box 96, West Highway 54
Liberal, KS 67901
(316) 624-8111, IN KS 1-800-362-9000
Outside KS 1-800-835-2057

Exclusive Cromemco dealer, specializing in complete business systems. Provides consulting services. Full inventory.

Key Personnel: David Fuller, Store Manager
Ray Cole, System Development
Kevin Elmore, System Development
Clark D. Stewart, President
Wayne Stewart, Vice President

Major Market Area: Sales: S.W. Kansas, extending to Colorado, Kansas, Oklahoma, Texas, New Mexico.
Service: S.W. Kansas

SYNERGISTICS INTERNATIONAL LTD.
35 Fountain Square Plaza, Suite 207
Elgin, IL 60120
(312) 695-7775

Full inventory of Cromemco hardware and software. Custom software developed in-house. Vertical market packages available include: Chiropractic Clinics; Architectural Woodwork Job Costing; Social Service Agency Accounting; Auctioneering. Specializing in providing turnkey systems to small and medium sized businesses.

Key Personnel: Jim Knowles, Pres. (Sales)

Major Market Area: Sales: Chicago and suburbs, extending to entire U.S. and the U.K. Service: Chicago and suburbs.

Eastern United States

CCS, INC.
A Computer Services Company
733 Third Avenue
New York, NY 10017
(212) 986-7520

Large Cromemco OEM specializing in custom applications on Cromemco Hardware. Full range of services including hardware sales, rentals, long and short term leasing, custom programming and continuous hardware and software support. Specialists in database and large scale financial applications.

Key Personnel: Richard Levey, Vice President
John Ruffo, Vice President

Major Market Area: U.S. and Major cities throughout the world.

TREXIS (Formerly Computer Closet Inc.)
45F Route 303
Valley Cottage, NY 10989
(914) 268-5161

Complete systems house providing sales, service and support for the full line of Cromemco hardware and software. Provides system planning and design for custom applications in business, education, and professional fields. Regular schedule of seminars and training classes offered.

Key Personnel: Rick Townsend, President

Major Market Area: Sales: Northeast U.S. and East Coast
Service: Continental U.S.

CUSTOM COMPUTER SPECIALISTS, INC.
300 Vanderbilt Motor Parkway
Hauppauge, NY 11788
(516) 231-1155

Full service systems house with retail showroom. Full line of Cromemco hardware, software, accessories, and literature. Provides warranty service, diagnostics, consultation, systems analysis, and custom programming. Special management software for attorneys, mass transportation scheduling, reservations, delivery manifests, education, small business.

Key Personnel: Gregory G. Galdi, President
Linda M. Miller, General Manager

Major Market Area: Sales: Northeast U.S., extending to East Coast.

Service: East Coast extending to Continental U.S.

SYSTEMS ATLANTA, INC.
P.O. Box 99
Highway 5, Toonigh Road
Lebanon, Georgia 30146
(404) 928-0240

As one of Cromemco's oldest dealers, Systems Atlanta is well experienced in hardware and software implementation. With over 1000 systems installed and a full staff of highly seasoned employees, Systems Atlanta of-

fers technical support for operating systems, application software and hardware design. Specific configurations include telecommunications, graphics, data base management as well as fully integrated accounting systems. Systems Atlanta has authored several specific applications packages such as Manufacturing and Inventory Control, Church Management, Job Costing and Unix based programs.

Key Personnel: Charley Dobson, President & G.M.
Betty Dobson, Dir. of Finance & Admin.
Gary Kendrick, Dir. of Marketing
Steve Garrison, Operations Manager

Major Market Area: Worldwide, with exports to South America, Europe, the Middle East and Canada.

Canada

COMPUTER SOLUTIONS
1700 Varsity Estates Drive N.W.
Calgary, Alberta
Canada T3B 2W9
(403) 286-8459 Telex: 03-827506

Complete sales, service and support center for Cromemco and a variety of quality peripherals and support products. Specializing in support over long distances, OEM accounts, custom software, solutions to computing concerns.

Key Personnel: Bob Pyle, General Manager
Mark Dutchuk, Customer Support
John Shepherd, Sales Manager

Primary Marketing Area: Western Canada
Extended Marketing Area: Eastern Canada, Northern/ North-Western U.S.

D.E. SYSTEMS LTD.
1284 Wellington St.
Ottawa, Ontario
Canada, K1Y 3A9
(613) 729-5164

D.E. Systems Ltd. is a full service company offering Cromemco Hardware, Software Development, Education and Application Programs. We have developed integrated Inventory, Point-of-Sale, Invoicing, Accounting and Sales Analysis programs as well as a Courier Package. We specialize in Cromemco Computers for government and small businesses. We have most Cromemco products in stock and offer technical support on the hardware and software. We offer maintenance of all Cromemco equipment and related peripherals.

Key Personnel: Bruno Dugas, President
Keith Corkum, Director (Systems Development)
Dwight Presley, Senior Analyst

Major Market Area: Eastern Canada

Mexico

SOPORTE ADMINISTRATIVO COMPUTACIONAL, S.A.
15 de Mayo 1111 Pte.
Monterrey, N.L., Mexico
Tels. (83) 43-83-40 and 44-62-69

Complete line of Cromemco hardware and software in inventory. Specializing in Business with Software packages (in CROMEMCO Structured Basic) in Spanish according to Mexican Laws and Taxes including Accounting, Payroll, Accounts Receivable and Payable, Inventories, etc., provides full service facility, including technical consulting, custom software, warranty and repair.

Key Personnel: Juan Angel Perez, Director
Luis Ernesto Rodriguez G., Marketing
Delfino Juarez, MSEE Technical Support

Major Market Area: Northeast Mexico

International

Europe

Middle East

MICRO COMPUTER SYSTEMS MARKETING CENTER
P.O. Box 1446
Jeddah, Saudi Arabia
(966) (2) 851-7707 or 853-0580/Telex 928-403068 MICSYS SJ

Authorized Dealer in Jeddah-Saudi Arabia (Western Zone) for Cromemco sales and maintenance of computers, peripherals, software development and design. Strong Arabic Software development.

Key Personnel: Abdul Rahman H. Attar, General Manager
Issam Al Safadi, Administrative Manager
M. Ali Khan, Marketing Executive

REALTIME ENGINEERING & DATA ANALYSTS
P.O. Box 278

Dhahran Int'l Airport
Dhahran, Saudi Arabia
(966) (3) 8649043/Telex: 928-670480 READAK SJ

P.O. Box 6156
Jeddah
Saudi Arabia
(966) (2) 6531502

Sales and maintenance of computers, peripherals and supplies within the areas of automation, industrial, business and office. Security systems. Strong in developing ARABIC SYSTEMS (hardware and software) and turnkey projects. Large simulators and facsimile.

Key Personnel: A.A. Salamah, Administrative Director
Nasir Jamil, Manager Digital Systems Div.
Ziyad Ismail, Software Design and Development

Major Market Area: CROMEMCO distributor for Middle East (Saudi Arabia, Gulf Emirates, Iraq, Syria, Jordan, Lebanon)

Far East

ASAHI GLASS

Electronics Group
Special Products Marketing Div.
1-2 Marunouchi, 2 Chome
Chiyodaku, Tokyo 100
Japan
781-24616/Telex: 24616 ASAGLAS

Complete line of Cromemco hardware and software in inventory. 700 sq. foot training room. Specializing in O.S. modifications. Full service facility, providing technical consulting as well as warranty repair service.

Key Personnel: Shigeo Satoh, General Manager (systems)
Norimasa Hori, Manager (sales)
Shinichi Watanabe, Tech/software

Major Market Area: Japan

NCC INTERNATIONAL

Matsunaga Bldg. 1-6-6 Sotokanda Chiyodaku Tokyo 101
Japan 03-(255)7991 / Telex: 781-2523758 KKSHIP J

The oldest microcomputer store of the Byte Inc. Group, offering CROMEMCO to Japan since 1977. This company primarily sells CROMEMCO equipment, and provides high technology and comfortable customer service.

Key Personnel: Kiyotake Ikeda
Ryuichi Kawase

Major Market Area: Japan

SUPER-NATURE COMPUTER CO., LTD.

4F-1, No. 239, Ta-An Road, Sec. 1
Taipei, Taiwan. Republic of China.
(02) 705-2442, (02) 700-4858/TELEX: 13937 SNCOMPUT

Our Company primarily sells CROMEMCO computer equipment with high technology and experience, providing installation, warranty repair service and customer education.

Specializing in O.S. modifications, software and hardware development for business and industrial applications.

Key Personnel: Miss Su-Chin Kuo, President
Mr. Mark Yeh, Sales manager
Mr. Morgan Chen, Import/Export department
Mr. Ringol Shiung, Chief of R&D department

Australia

MINICOMP

Minicomp Building
104 Mount St.,
North Sydney, NSW. 2060
Australia
(02) 957-6800
AA75774 MINICO

Key Personnel: Mr. Murray Cleworth, Managing Director
Ms. Kim Ballestrin, National Sales Manager
Ms. Lyn Lyons, Software Development

Minicomp is a major Australian distributor for Cromemco. Services include installation, integration, software support, professional training and software development. We also offer a wide range of peripherals and software compatible with Cromemco systems. We take great pride in providing fast efficient service and support.

INSYSTEMS PTY. LTD.

337 Moray Street
South Melbourne, Victoria 3205
Australia
(03) 690-2899, telex AA30458
84-86 Pacific Highway
St. Leonards, New South Wales 2065
Australia
(02) 439-3788

Australia's largest Cromemco suppliers, with a staff of 18, providing professional services in all areas of computer implementation.

Key Personnel: Dr. Simon Rosenbaum, Managing Director
Norman Rosenbaum, General Manager
Tony Benci, Sales Manager
Ian Holland, Senior Programmer
Sue Stevenson, Sydney Sales

Major Market Area: Australia wide. Dealers in QLD and TAS.

PERSCI REPAIR

SPECIALISTS IN CROMEMCO/PERSCI
PROFESSIONAL SUPPORT AND DOCUMENTATION
REPAIR SERVICE FROM \$200.00
30-DAY WARRANTY ON SERVICE & PARTS
UTILITIES TO DRAW & PLOT
FOR SBASIC AND PLANMASTER
GRAPH-10 \$74.95

C-10 GRAPHICS

TREXIS Incorporated
(Formerly Computer Closet, Incorporated)

45F ROUTE 303
VALLEY COTTAGE, NY 10989
(914) 268-5161

Application for Membership

☐ Yes

Subject Matter: _____

CROMEMCO COMPUTERS: DESIGNED TO MAKE UNIX SYSTEM V EVEN BETTER...

UNIX System V, the new standard in multi-user microcomputer operating systems, gives you high performance features along with the portability and flexibility of a standard.

Cromemco computers can make UNIX System V even better. Because our systems are designed with UNIX in mind. First of all, we offer UNIX System V with Berkeley enhancements. Then, our hardware uses advanced features like 64K of on-board cache memory and our high speed STDC controller to speed up disk operations—very important with UNIX.

More capability and expandability

We have a high-speed, 68000-based CPU that runs at 10 MHz, coupled with a memory manager that uses demand-paging and scatter loading to work *with* UNIX, not for it.

We provide room for expanding RAM to 16 megabytes—with error detection and correction—for running even the most sophisticated and advanced microcomputer programs. And the power to accommodate up to 16 users—all with plenty of memory.

But we give you even more.

A complete solution

We give you a choice in systems: the System 100 series, expandable up to 4 megabytes of RAM, and the System 300 series, expandable to 16 megabytes. A high speed 50 megabyte hard disk drive is standard on the systems. And you can expand the hard disk capacity up to 1200 megabytes using standard SMD drives. You can add floating point processing. High resolution graphics. Video digitizing and imaging. Communications through

standard protocols. Mainframe interface.

And software support is here to meet your needs. We offer major programming languages, database management systems, communications software, including SNA architecture, X.25 protocol, and Ethernet; even a program to interface to an IBM PC if you need to. And, of course, access to the broad range of standard UNIX applications programs that is growing dramatically every day.

Easy to use.

We also make our systems easier to use, because we install the operating system before we ship your computer. No complicated installation procedures. And the Berkeley enhancements give you the standard UNIX System V operating system, but with the added convenience of these widely acclaimed improvements.

Cromemco's System 100 and System 300 computers: designed to be the highest performance UNIX systems available anywhere.

Just call or visit one of our UNIX System V Official System Centers to see for yourself. They'll also give you a copy of our new publication, "What you should know before you buy a UNIX system." Or contact us directly.

We'll be glad to show you how to get a better UNIX system.

Corporate Headquarters: Cromemco, Inc.,
280 Bernardo Avenue, P.O. Box 7400, Mountain
View, CA 94039. (415) 969-4710. In Europe:

Cromemco
GmbH, 6236
Eschborn 1,
Frankfurter Str.
33-35, P.O. 5267,
Frankfurt Main,
Germany.

